



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



## IMPACT OF WATER USERS ASSOCIATIONS ON WATER AND LAND PRODUCTIVITY, EQUITY AND FOOD SECURITY IN TAJIKISTAN

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## Acronyms

FFP	Family Farming Program
FTF	Feed the Future
MOH	Member of the household
TJS	Tajikistan Somoni (unit of currency). Approximate rates of exchange with the US dollar were 5 TJS/USD in 2014 and 6 TJS/USD in 2015. By April 2016, the Somoni had depreciated to almost 8 TJS/USD.
USAID	United States Agency for International Development
WUA	Water Users Association

## Local terms

<i>Dehkan farms</i>	Registered individual, family or small-scale collective farms
<i>Jamoat</i>	Administrative division, similar to municipalities
<i>Vodkhoz</i>	District water management department

# Summary

The International Water Management Institute (IWMI) was engaged by the United States Agency for International Development (USAID) through the Feed the Future initiative, to examine whether water users associations (WUAs) created and supported by USAID produced sustained increases in resource productivity, food security, and equity in southern Tajikistan, even after donor support was withdrawn.

This evaluation consists of three research components, to be implemented from 2015 to 2018. These research components are:

1. Identifying opportunities and constraints for the sustainability of WUAs;
2. Assessing the persistence and equity of impact on irrigation services, crop choice, and cotton productivity; and
3. Examining the role of women in irrigation water management to identify opportunities for enhancing food security.

The present report draws on a household survey conducted in February and March 2016 to bring insights to these three research components.

The first chapter of the report describes the methodology of the household survey. The household survey aimed to better understand household farmland area and use, agricultural labor division and decision making, crop selection and inputs, the availability of irrigation water, and participation in community and water governance. A sample of 1,920 households was surveyed in 160 villages belonging to 80 *jamoats*. Half of these *jamoats* benefitted from the Feed the Future Initiative with the creation or support of WUAs and are therefore considered as treated whereas the second half of the sample is made of control *jamoats*. Treated and control *jamoats* share the same characteristics and were selected using the propensity score matching method. Villages have been selected on the basis of proportional sampling and households were randomly selected in each village. The questionnaire was answered by women respondents.

The second chapter contributes to the component 1 in analyzing the role of women in water governance and WUAs. The analysis suggests that if both USAID and Non-USAID WUAs provide membership to nearly all female-headed *dehkan* farms from their command areas, then at the household level interactions with irrigation service providers (either WUAs or *vodkhoz* offices) in the form of meeting attendance, membership, or conflict resolution is very limited. This may reflect a lack of confidence among households in the ability of either institution to impact meaningfully the irrigation challenges they face.

The third chapter brings insights to the second component of the research by focusing on agriculture and water management in kitchen gardens and presidential plots. These two types of plots differ legally and geographically from the *dehkan* farms and contribute to the homestead production system. The data underlines the essential role of kitchen gardens and to a lesser extent of presidential plots for agricultural production, especially for households not owning a *dehkan* farm. The production on kitchen gardens is well diversified and almost entirely self-consumed. Vegetables and fruits are usually grown in kitchen gardens, while presidential plots are mostly used to grow fodder and cereals. As in the case of *dehkan*

farms, the irrigation of kitchen gardens and presidential plots is largely dependent on irrigation canals. The peak season for water needs is from March to September. In treated locations more households have access to irrigation for their kitchen garden and they have access to water for a longer period (of months per year) than in control areas. Yet, water theft is not rare and is more often reported in treated villages than in control villages, both for kitchen gardens and for presidential plots. The large majority of the women respondents have no clear idea on who provides the water which is used for irrigation of their crops. Finally, most of the households need to pay for the water provided to their kitchen gardens and presidential plots and more households need to pay in the treated zone as compared to the control zone. However, confusion exists about the recipients of the payments for water.

The fourth chapter is part of the component 3 of this research. By examining the primary responsibility for agricultural tasks and decision making, the chapter brings more evidence on the role of women in agriculture and in water management. The results highlight that while traditional notions of the gendered division of labor hold that household cultivation is dominated by women, men primarily make and execute overall agricultural decisions on kitchen, presidential, and *dehkan* farm plots and lead the decisions. Yet, women are involved in those tasks but not as the primary actor or decision maker. It is only for very specific tasks that women household member are primarily responsible: sowing and harvesting of crops on the kitchen plots, storing seeds from the kitchen and presidential plots for use next season, and giving feed to livestock. Female household members are also the primary decision makers as to the amount of kitchen garden produce that should be sold, stored, or consumed by the household. However, the data show that these overall divisions of labor vary distinctly when the gender of the head of the household or household migration is taken into consideration. In female-headed households and households from which men migrated, women take on more responsibility for activities and decisions related to land preparation, the tending of crops, as well as harvesting and processing on kitchen, presidential and *dehkan* plots.

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## INTRODUCTION

Over the course of the 1990s and early 2000s, the centrally managed *Kolkhoz* and *Sovkhoz* farms that had dominated agricultural production during the Soviet era were gradually divided into smaller farming units, known as *dehkan* farms. These farms were passed onto individual households and multiple households working together with permanent and inheritable land use rights; however, ultimate ownership of the land still remains with the state (Robinson *et al.* 2008). As of 2014, there were 108,035 *dehkan* farms in Tajikistan (Hasansoda 2015). Approximately 49% of all *dehkan* farms are located in Khatlon Province (Hasansoda 2015).

Since their inception, *dehkan* farms have faced challenges in production, particularly as a result of inadequate access to, and the poor management of irrigation water. Irrigation under the Soviet Union had been designed to serve the large-scale cultivation of crops, primarily cotton—a legacy that resulted in uneven access to water between the neighboring *dehkan* farms (Shahriari 2009). Furthermore, in the years since independence, irrigation infrastructure had been damaged during the civil war, causing both water scarcity and the waterlogging of soils in many agrarian communities. Hampered by a lack of funds for the operation and maintenance of systems, in 1996, the government began to charge for the use of irrigation water; however, the collection of these fees proved difficult as farmers grappled with the high cost of inputs and pervasive poverty in rural areas (Shahriari 2009).

Challenges accessing irrigation water are not exclusive to *dehkan* farming, but are also experienced by families that cultivate crops at the household level, as the canal networks which serve *dehkan* farms also commonly provide water to kitchen gardens and presidential plots. Kitchen gardens existed throughout the pre-Soviet and Soviet eras and are located near or within housing compounds. Additional land for household cultivation was given to families who had kitchen gardens smaller than the national minimum through presidential decrees in 1995 and 1997. The decrees reallocated a total of 75,000 hectares of land from former Soviet collective farms that became known as presidential plots (Lerman and Sedik 2008; Robinson *et al.* 2008). Both types of plots are typically used to grow crops for household consumption (Rowe 2009). In some ways, the difficulties households face accessing irrigation water may be more acute than *dehkan* farms. Presidential plots are often located far from canals, and kitchen gardens tend to use the same sources of water that households need to complete multiple domestic tasks, including providing drinking water for household members and livestock, as well as for cleaning, and washing clothes (Shahriari 2009).

When Water Users Associations (WUAs) were first introduced to Tajikistan, they were primarily designed to support improved access to irrigation water and management services for *dehkan* farms. To this day, only managers of *dehkan* farms are legally eligible to become WUA members, which excludes households that only cultivate kitchen or presidential plots from membership (Family Farming Program Staff 2013).

However, regardless of their formal membership or active participation in WUAs, families that cultivate irrigated crops at the household level are still included within WUA service areas. The reported number and combined areas of presidential plots and kitchen gardens that exist within USAID-initiated and supported WUA service areas are listed in table 1.

**Table 1 - Numbers and areas of kitchen gardens and presidential plots within USAID-WUAs service area**

	Kitchen Gardens	Presidential Plots
Number	165,799	76,391
Hectares	26,745.01	8,134.7

Source: Data reported by WUAs and collected through survey by authors in 2014.

As these plots are located within WUA service areas, WUA activities have the potential to impact the opportunities and constraints experienced in the cultivation of crops on kitchen and presidential plots—namely, though not exclusively, by affecting water availability, the process of fee collection, access to information, ability to voice concerns, collaboration and collective action.

- *Water Availability* - Physical improvements to water infrastructure initiated by the WUA, including the installation of water gates or cleaning of canals, as well as the provision of services such as dispute resolution, the development of an irrigation schedule, or other measures to ensure the regular and fair distribution of water to *dehkan* farms each have the potential to impact access to water for kitchen gardens and presidential plots.

While households may generally be considered secondary beneficiaries of WUA activities to expand water availability to *dehkan* farms, in 2014, WUAs under the USAID Family Farming Project (FFP) were directly involved in improving “intra-village water access” and the delivery of irrigation water to kitchen and presidential plots (Family Farming Program Staff 2013). This program covered ten villages in Qubodiyon, Shahrituz, and Nosiri Khusrav districts of Khatlon province and was carried out by WUAs working in coordination with FFP staff and village committees. Under the project, WUAs facilitated the installation of 22 distribution gates, the construction of one water distribution structure as well as the rehabilitation of six gates, three aqueducts, and one pump station (Family Farming Program Staff 2014). It was estimated that these activities improved irrigation services for more than 4,150 households (Family Farming Program Staff 2014).

- *Process of Fee Collection* - WUAs may also have direct engagement at the household level through the collection of water fees, as according to the 2006 Law on Water Users Associations, fees must be levied and paid by both members and non-members who irrigate land covered by the WUA service area, which would include kitchen and presidential plots, as well as *dehkan* farms (Shahriari 2009).
- *Access to Information* - Many WUAs, including those initiated by USAID, have hosted trainings for WUA members on a number of topics including conflict management, irrigation system maintenance and management and access to credit (Family Farming Program Staff 2014). Through attendance or by speaking with an attendee, households may gain new knowledge allowing them to implement improved agricultural methods on kitchen and presidential plots or more clearly understand the process of water provision and their rights within this system.

- *Ability to Voice Concerns* - WUAs initiated under USAID's FFP have hosted meetings for members with governmental authorities, which affords farmers an opportunity to ask questions, voice complaints, or offer suggestions (Family Farming Program Staff 2013). Informally, individuals that only cultivate household plots may also discuss water-related concerns or needs with WUA staff. Additionally, owners of kitchen gardens and presidential plots may be able to approach WUA staff with recommendations or requests through a village committee (Family Farming Program Staff 2013).
- *Collaboration and Collective Action* - By bringing farmers from around the community together, WUA trainings and meetings may also foster collaboration among individuals, both in regards to water management at various levels of farming and other challenges facing the community, such as access to agricultural inputs like machinery.

Through these different pathways, WUA activities may have secondary impacts on water access, crop selection and plot productivity for kitchen gardens and presidential plots. In 2015, qualitative research conducted by IWMI, in agreement with other studies (Rowe 2009; Shahriari 2009), found that constraints related to a lack of irrigation water or irregular access to water play a role in household decisions about which crops to grow and can have a dramatic impact on their yields. By extension, household nutrition and revenue may also be affected, as crops harvested from household plots provide a central source of food and income, in the event that there are surplus crops for rural families (Rowe 2009, Shahriari 2009).

With this in mind, investigating crop cultivation and irrigation services at the household level, in addition to the *dehkan* farm level, is essential to understanding the full extent of WUAs impacts on agricultural productivity in Tajikistan. Previous research on household level agriculture in Tajikistan is limited; however, several notable studies have been published.<sup>1</sup>

In March 2016, IWMI conducted research to deepen understanding of the practices and constraints faced by households in Southern Tajikistan in the cultivation and irrigation of presidential plots and kitchen gardens. As part of the evaluation of the WUAs created by FFP, the purpose was also to understand to which extent households benefit from WUAs' activities that are mainly targeted toward *dehkan* farms.

Through the use of a survey instrument, information on household farmland area and use, agricultural labor division and decision making, crop selection and inputs, the availability of irrigation water, and participation in community and water governance was collected from approximately 2,000 households. Questions were also asked about food security, migration, income and household assets to contextualize and seek correlations in data collected. The survey was conducted in *jamoats* benefitting from the FFP and where WUAs have been created (treated group) and in similar *jamoats* where FFP did not intervene (control group).

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<sup>1</sup> See for example, William Campbell Rowe's "Kitchen Gardens' in Tajikistan: The Economic and Cultural Importance of Small-Scale Private Property in a Post-Soviet Society, which examined the dynamics of household production in Hissor Valley in 1999 and 2000; Helen Shahriari's "Agriculture Activities, Water, and Gender in Tajikistan's Rural Sector" which in 2009 included a review of irrigation water use and access on kitchen and presidential plots in Konibodom and Bobojon Ghafurov in Sughd and Yovon in Khatlon; and the "Intra-village Irrigation Assessment" conducted by USAID in 2014 in ten villages of Khatlon and provided in the USAID Family Farming Program for Tajikistan Annual Report: Year Four.

The survey was targeted at female household members knowledgeable about agriculture at the household level. In pre-Soviet Tajikistan, women's work in agriculture was exclusive to the cultivation of household plots and their engagement in tending these plots has continued over the last century. In the years since independence, the displacement or death of men during the civil war (1992-1997) and high levels of male out-migration have resulted in many women taking on principal responsibility for the growth and harvest of crops on household plots (Rowe 2009). As a result of the significance of their role in kitchen garden and presidential plot cultivation, understanding how women view and negotiate the opportunities and constraints posed by cultivation and irrigation on these plots is of special importance.

The following report presents findings related to three key issues which contribute to an understanding the aforementioned topic: the role of women in water governance and WUAs; agriculture and water management in homestead production systems; and labor division and decision making within the household. After a first chapter describing how the household survey was conducted, the sample and the methodological choices, the three other chapters are based on the analysis of the survey data.

The second chapter contributes to the component 1 of the research which aims to identify the opportunities and constraints for the sustainability of the WUAs. More specifically, this chapter analyses the role of women in water governance and WUAs. Membership, participation, meeting attendance, relation with water providers and conflict resolution are described for treated and control *jamoats* from the perspective of *dehkan* farm owners and women household members.

The third chapter brings insights to the second component of the research which assess the persistence and equity of impact on irrigation services, crop choice, and cotton productivity with a focus on kitchen gardens and presidential plots. The analysis considers the cropping patterns and functions of these plots and describes the water needs, water access, water conflicts, payments and maintenance related to homestead production. Results are disaggregated by the treatment status.

Finally, in the fourth chapter the primary responsibility for agricultural tasks and decision making is analysed. This contributes to the third component of the research which examines the role of women in irrigation water management to identify opportunities for enhancing food security. Based on the survey data, the chapter identifies the gender of the primary manager and decision maker and stresses differences based on the gender of the head of household, on emigration status and on USAID treatment.

# CHAPTER 1 - HOUSEHOLD SURVEY: OBJECTIVES AND METHODOLOGY

## 1.1. Objectives of the household survey

The household survey aimed to analyse the changing role of women in agriculture but also to collect information from the owners of kitchen gardens and presidential plots to understand to which extent and how they may benefit from the WUAs. The impact pathways between WUAs and food security will also be explored on the basis of the data collected with the household survey.

In addition, the survey was designed to respond to some of the research questions identified from the qualitative data collection on gender. More specifically, it offered a chance to explore:

- Trends in primary responsibility for the physical application of irrigation water on different plots
- Water availability and access to irrigation water on different plots, by type-of-treatment status
- Institutional support
- Practices surrounding payment of water fees
- Women's participation in WUAs, and
- Male out-migration

It is agreed that the household survey data will not be used for a rigorous impact evaluation. However, it will be analysed using descriptive statistics and econometric methods in order to understand better the context in which the program was implemented, the potential effects beyond the farms and the heterogeneity of the beneficiaries.

## 1.2. Sample design

### 1.2.1. Selection of the *jamoats*

Even if the purpose of the survey was not to do impact evaluation, it remained important to keep control and treated locations in order to be able to do comparison analysis based on the respondents' access to WUAs and on the type of WUAs. For this reason, the survey was conducted in the 80 *jamoats* where the *dehkan* farm survey had been conducted in 2015. In doing so, three groups can be distinguished: (i) treated group with USAID WUAs, (ii) control group with non-USAID WUAs and (iii) control group without any WUAs.

The selection of the *jamoats* was based on a propensity score matching which ensures that in the three groups the *jamoats* share similar characteristics in terms of land use, agricultural patterns, source of water for irrigation, population, access to infrastructure and markets. The data used for the propensity score matching and for the selection of the *jamoats* sampled were collected from 164 *jamoats* in 25 districts from in Khatlon (116), Sughd (21) and DRS (27) provinces. Acknowledging that the treatment was not randomly assigned, those locations were selected in gravity water-supply schemes where land reform was finalized and where irrigated cultivation of wheat and cotton were predominant agricultural activities. Using the propensity scores, *jamoats* served by USAID WUAs were matched to *jamoats* not served by

USAID without replacement to their nearest neighbor, in order to select 80 *jamoats* in all – 40 treated by USAID, and 40 with either WUAs not set up by USAID or irrigated *jamoats* without WUAs.

A complete list of attributes that were used to construct the propensity scores, the model of treatment and more details on the method can be found in this project’s baseline report (Balasubramanya *et al.*, 2016)

### 1.2.2. Selection of the villages

Considering the focus on the characteristics and behaviour of households and the fact that several thousand households can be found in one *jamoat*, we restricted our sample to only some villages from the selected *jamoat*. Indeed, if households were selected from the entire *jamoat* their location would be scattered, which would complicate the data collection for the enumerators. As well, the analysis may also be biased if households from the same cluster do not share basic characteristics and especially if they do not have access to the same source of water, for example.

It was therefore decided to survey two villages in each *jamoat*. The selection of the villages was done on the basis of a proportional random sampling. The criteria taken into consideration were the type of canal serving the villages (primary, secondary, tertiary) and the location of the village along the canal (head, middle, tail). With this method, we obtained a representative sample of villages in terms of their access to water. The required data were collected by “Taxlil va Mashvarat Ltd” (under the Z-Analytics Group) from secondary sources and verified with key informants from the respective locations when required.

### 1.2.3. Selection of the households

In each village, 12 households were surveyed. With the understanding that households from the same village are usually based in the same settlement and share the same source of water for irrigation, we simply did a random sampling of the households selected for the survey.

The lists of households for each of the 160 villages were established by enumerators based on census data available at *jamoat* offices. When possible, in addition to the name of the household head, other information was collected, namely, the number of household members and female members over the age of 16, as well as household ownership of kitchen garden, presidential plots, and *dehkan* farms. When this information was available, the random selection was run only among households that had at least one adult woman and that cultivated a kitchen garden or presidential plot. When this information was not available, the selection was done randomly on the entire list of households and if a selected household did not possess the required characteristics, it was replaced.

Twelve households were randomly selected in each village in the principal list and 24 in the replacement list. Households from the replacement list were interviewed if respondents from the principal were absent, refuse to respond, if no adult woman was available, or if the household selected in the main list did not cultivate a kitchen garden or presidential plot in 2015.

Replacements were relatively rare excepted in *jamoats* where the households list happened to be inaccurate and outdated.

#### 1.2.4. Sample size and structure

In total, 1920 household were surveyed, they are located in 160 villages belonging to the 80 *jamoats* previously surveyed in 2015 for the *dehkan* farm survey.

Table 2 describes the structure and location of the sample.

**Table 2 - Sample size and location**

Oblast	District	Number of households	Treated	Control
DRS	Gissar	24	0	24
	Tursunza	96	0	96
	Shakhrin	96	0	96
	Sub-total	216	0	216
Khatlon	Bokhtar	144	48	96
	Vakhsh	132	72	60
	Vose	48	24	24
	Dangara	72	0	72
	Dzhami	144	120	24
	Dzhillik	84	48	36
	Kabodien	144	120	24
	Kulyab	96	24	72
	Kumsangi	96	96	0
	N.Husrav	48	48	0
	Piandzh	48	0	48
	Rumi	168	121	47
	Sarband	24	0	24
	Temurmali	24	0	24
	Farhor	144	0	144
	Hamadoni	48	0	48
	Huroson	48	48	0
	Shaartus	96	96	0
	Yavan	96	96	0
		Sub-total	1704	961
<b>TOTAL</b>		<b>1920</b>	<b>961</b>	<b>959</b>

The sample is balanced in terms of the treatment status of the households: 50% of the surveyed households live in *jamoats* which benefitted from USAID-FFP intervention in the form of infrastructure rehabilitation and improved water governance with creation of WUAs, and 50% of the households are in

control locations which did not benefit from USAID intervention. The latter group may contain some WUAs that were created by other donors or institutions.

In the following chapters, when a difference between treated and control is mentioned, it refers to the two groups of households as defined in Table 2. For sampling purposes, we defined the treatment at the *jamoat* level, but it can similarly be described as applying at the village or at the household level.

### 1.3. Questionnaire instrument and respondents

#### 1.3.1. Household questionnaire

The questionnaire was designed to respond to the research objective previously outlined and allow for robust quantitative analysis of the data generated. Table 3 provides a list of the sections included in the questionnaire and a brief description of the topics discussed in each section.

**Table 3 - Structure of the household questionnaire**

Section	Title	Description
1	Identification	Enumerator identification, household identification, individual identification with household's member roster
2	Agricultural land and farm membership	Ownership of different plots, areas cultivated, source of water
3	Agricultural labor division and decision making	Main contributors, main decision makers to agricultural activities for each type of plot
4	Crops, inputs and costs, water management, livestock	Characteristics of the homestead production system
5	Trainings	Household members' participation in training related to agriculture or water management
6	Community participation and water governance	Participation in groups and in WUAs
7	Food security	Food shortages, coping strategies and food security indicators
8	Migration	Migrants from the household and remittances
9	Household income, credits and loans	Type of income-generating activities by member, main sources of income, indebtedness
10	Household assets	Characteristics of the house and asset ownership

The questionnaire is attached to this report in Annex 1.

The questionnaire was initially designed in English and then translated into Tajik and Uzbek. Back and forward translation methods were used to be sure that the exact meaning of the questions was reproduced in the different versions of the questionnaire. The interviews were conducted in the language

in which the respondent was the most comfortable: 17% of the interviews were conducted in Uzbek and 83% in Tajik.

The interviews were conducted using electronic tablet devices and the questionnaire was designed using *CS Pro* software. This allowed the inclusion of a number of jumps and controls and therefore reduced the risk of error for the enumerator, improved the quality of the data generated and limited the time of the interviews. On average, interviews lasted 45 minutes.

### 1.3.2. Respondents

The respondents to the household questionnaire were knowledgeable women from the selected households. Usually it was the wife of the head of household (67%) or the head of household herself (if she lives alone) who responded (10%). In the case where either of these women was absent, another woman from the household responded to the questionnaire. In such cases, it was generally the daughter-in-law of the head of household (14%) who responded.

The questionnaire was targeted at women in order to collect their own perspective and with the underlying assumption that they would be more knowledgeable than male members for several sections. However, no private or sensitive questions were asked and other household members, including men, could be present during the interview. In 43% of the interviews conducted, men were present during at least some part of the discussion.

The presence of other household members, including men, also allowed women respondents to ask for assistance or confirmation for some questions. This occurred most commonly for the questions from sections 2 and 4 and men were called upon to answer parts of the questionnaire in 45% of cases.

Even if women were the main respondents, most of the questions concerned the household in general (considered as an independent unit of decision making and production) or asked about specific members of the household. Yet, some questions were asked to the respondent individually. In particular, this was the case for the questions on the access to information or perceptions. The distinction was clearly made in the questionnaire to distinguish when 'you' referred to the household and when it referred to the respondent herself. Similarly, in the following chapters we mention when the indicators presented refer to the woman respondent and not to the entire household.

## CHAPTER 2 - THE ROLE OF WOMEN IN WATER GOVERNANCE AND WATER USER'S ASSOCIATIONS

### 2.1 Introduction

In light of high rates of male out-migration in rural areas and the increasing number of female farm managers in southern Tajikistan, the active participation of all farm managers, including women, as WUA members is perceived to be a critical step towards the institutions' overall success and longevity. The number of female-headed farms has risen over the last five years from 4,237 in 2009 to 14,014 in 2014, representing 13% of total farm ownership (Hasansoda 2015, p.52). However, very little is currently known about women's interaction with irrigation service providers, whether they are the district water management authority (*vodkhoz*) or their WUA.

By law, only households with *dehkan* farms are eligible for formal WUA membership. Even though they may receive water from canals within the WUA command area, households that only cultivate kitchen gardens and presidential land (household plots) lack official representation in the organization (Family Farming Program Staff 2013). In comparison, *Vodkhoz* offices do not have membership requirements, and are officially responsible for controlling and administering primary canals that serve irrigated land, irrespective of plot type (Shahriari 2009). *Vodkhoz* offices are governmental institutions that manage water resources on the district level for the state Agency of Land Reclamation and Irrigation, whereas, WUAs represent non-governmental bodies. While they have similar purposes, it is possible for rural households to be served by the *vodkhoz* as well as a WUA. Whether households without *dehkan* plots can be formal members in non-USAID WUAs is not clear.

In recognition of the role they play in agricultural production on *dehkan* farms as well as household plots, this chapter focuses on women's participation in water governance. Utilizing data collected through the household survey in 2016, in combination with that of the WUA survey in 2014, the chapter analyzes the nature of women's awareness of and engagement with WUAs and *vodkhoz* offices in Khatlon province. These interactions are examined at the farm and household level.

### 2.2 Participation of female-headed farms in WUAs

In 2014, a survey was administered to 141 WUAs, comprising associations established under the direction of USAID as well as other international donors in Sughd, District of Republican Subordination (DRS), and Khatlon provinces.<sup>2</sup> The survey was directed to WUA management and asked questions the organization's history, boundaries, infrastructure, constituent farmers, and irrigation service delivery.

#### 2.2.1 Membership of female-headed farms in WUAs

Data collected from the WUA survey indicates that almost all female-headed farms (FHF) in the command area of USAID and Non-USAID WUAs are WUA members (95% and 89%, respectively). USAID WUAs appear

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<sup>2</sup> 108 WUAs were surveyed in Khatlon province—representing the majority of respondents—and includes WUAs established by USAID under the Family Farming Program (FFP) as well as the Water User Association Support Program (WUASP).

to have a higher percentage of female-headed farms that are WUA members, in comparison to Non-USAID WUAs, but these differences are not statistically significant (Table 4).

**Table 4 - Female-headed farm membership by WUA type**

	USAID	Non-USAID	Total
Average number female-headed farms in WUA command area	32.15	72.96	51.54
Percentage female-headed farms out of all farms in command area	8%	16%	12%
Percentage female-headed farms that are WUA members	95%	89%	92%
Percentage male-headed farms that are WUA members	98%	98%	98%
Total responses	n=74	n=67	n=141

### 2.2.2 Female representation in WUA management

When asked about female participation within WUA management, both USAID and Non-USAID WUAs reported that women represent a minority of official positions (Table 5). The majority of office bearers are male.

Data collected through the WUA survey suggests that, according to WUA leaders, female-headed farms are largely recognized as members of the WUA; however, their representation in WUA management is limited.

### 2.3. Participation of female household members in water management and governance

A module of the household questionnaire was devoted to asking women about their households' involvement with community organizations and irrigation service providers; including questions regarding meeting attendance and the nature of their interaction with WUAs and *vodkhoz* offices. The sample size of this study was 1,920 households.

**Table 5 - Female office bearers by WUA type<sup>3</sup>**

	USAID	Non-USAID
<b>WUAs with female chairperson</b> <i>(USAID n=70, Non-USAID n=67)</i>	4.29%	1.50%
<b>WUAs with female vice-chairperson</b> <i>(USAID n=53, Non-USAID n=20)</i>	0.00%	0.00%
<b>WUAs with a female board member</b> <i>(USAID n=59, Non-USAID n=35)</i>	18.64%	17.14%
<b>WUAs with female treasurer</b> <i>(USAID n=39, Non-USAID n=35)</i>	17.95%	31.43%
<b>WUAs with a female water user group leader</b> <i>(USAID n=17, Non-USAID n=14)</i>	11.76%	14.29%
<b>WUAs with female mirob</b> <i>(USAID n=10, Non-USAID n=10)</i>	0.00%	10.00%

### 2.3.1 Participation in community organizations

The incidence of households participating in agricultural, livestock or water related groups is low, with only 61 of the 1,920 respondents reporting that their household was part of any such group (Table 6). Of the 61 responses, 38 indicated that their household was part of an agricultural group, 18 indicated a WUA, 2 a livestock group, and 3 were not able to indicate the type of group.

These responses suggest that either there are few opportunities for households to be involved in community organizations, or that women are not aware of whether their households are involved in such groups.

**Table 6 - Household membership in groups (n=1920)**

Type of group	No	Yes
Agricultural	1859	38
Livestock Management	1859	2
WUA	1859	18
Don't Know	0	3

<sup>3</sup> The difference in sample sizes (n) for each position results from variations in the number and type of office bearers reported by respondents in the WUA survey. Regardless of USAID or Non-USAID status, not every WUA reported a consistent type or number of positions.

### 2.3.2 Participation in WUAs

Respondents were explicitly asked about their personal involvement with WUAs. When asked if there was a WUA in their village or *jamoat*, only around 43% were able to answer the question definitively, with 57% of women stating that they did not know if such an organization existed in their village or *jamoat* (Table 7). However, the responses between households in USAID villages and those in Non-USAID villages are different at 1% ( $p$ -value=0.0097); 20% of respondents in the USAID group ( $100 \times (10.58 / 50.05)$ ) stated there was a WUA in their village or *jamoat*, while only 13% of respondents in the non-USAID group stated that there was a WUA ( $100 \times (6.62/49.95)$ ). Correspondingly, far more respondents in the non-USAID group stated there was no WUA in their village or *jamoat* than respondents in the treatment group. This reflects the fact that there is a greater likelihood of there being WUAs in USAID villages than in non-USAID villages.

**Table 7 - WUA in the village or jamoat (n=1920)**

	USAID	Non-USAID	Total
Yes	10.58%	6.62%	17.20%
No	10.36%	15.73%	26.09%
Don't know	29.11%	27.60%	56.71%
Total	50.05%	49.95%	100.00%

These responses suggest that the majority female household members are unaware of WUA presence in their community, which may indicate that women are rather disconnected from networks of information regarding community-based organizations.

### 2.3.3 Interaction with irrigation service provider

Women's interaction with irrigation service providers is minimal—irrespective of whether the service provider is a WUA or the irrigation department (94%). Only 116 respondents (6%) in total reported having personally interacted with an irrigation service provider, with no statistically significant difference in interaction between households lying in USAID villages and non-USAID villages even at 10% (Table 8).

Interaction with irrigation providers (Table 9) was mostly confined to the payment of fees (80 households); followed by requests for water and checking water schedules (23); and conflict resolution (8). There are no significant differences in the type of interactions between treatment and control households even at ( $p$ -value=0.67).

**Table 8 - Interaction with Irrigation Service Provider (n=1920)**

	USAID	Non-USAID	Total
Interacted	2.66%	3.38%	6.04%
Not interacted	47.40%	46.56%	93.96%
Total	50.06%	49.94%	100%

**Table 9 - Reasons for women interacting with irrigation provider (n=116)**

	Number	Percent
Conflict resolution	6	6.9
Fee payment	80	68.97
Requesting water applications/ checking water schedule	23	19.83
Infrastructure maintenance	0	0
Trainings	2	1.72
Participation in meetings	1	0.86
Other	2	1.72

Of the 116 respondents who claimed to have interacted with their irrigation service provider, 49 stated that they personally were members of the WUA and the remainder responded that they were not members, with no statistically significant difference in membership between women in treatment and control households (p-value=0.53).

These responses reinforce the idea that female household members are either largely not inclined or unable to interact with irrigation service providers.

#### 2.3.4 Attending meetings with the irrigation service provider

Only 70 respondents (3.6% of the entire sample) reported to having attended meetings of irrigation service providers; with 1,850 respondents not having attended any meeting. The most common reasons for non-attendance (Table 10) were the lack of a meeting being held or not being aware of a meeting (49%); followed by not being invited to any meeting (29%); and a lack of time (7.3%). When reasons for non-attendance at meetings were disaggregated by the respondents' awareness regarding the presence or absence of a WUA; the relative order of reasons was still the same.

Examining the reasons for non-attendance between the USAID and non-USAID groups (Table 11) does not reveal a statistically significant difference (p-value=0.13). Respondents in the USAID group reported more often that meetings were not conducted or that they were unaware if meetings were conducted (53% of responses in the USAID group) compared to respondents in the non-USAID group, who only stated these

reasons 45% of the times. However, only 25% of responses in the USAID group were about not being invited, in contrast to 33% of responses in the non-USAID group.

**Table 10 - Reasons for women’s non-attendance (n=1850)**

	Number	Percent
Meetings not conducted/unaware of meetings	906	48.97
Not interested	80	4.32
No time	135	7.3
Not useful	17	0.92
Difficulty in commuting	36	1.95
Not allowed by family	75	4.05
Not comfortable attending (All men in attendance)	9	0.49
Not invited	535	28.92
Someone else from household attends	57	3.08
Not able to pay fees	0	0

These responses suggest that female household members have limited opportunity to participate in meetings with irrigation service providers because they are either not invited or made aware of when and where the meeting is taking place, or because these forums simply don’t exist.

**Table 11 - Reasons for non-attendance by treatment status (n=1850)**

	USAID (n=961)	Non-USAID (n=959)
Meetings not conducted/unaware of meetings	52.60%	45.33%
Not interested	4.08%	4.57%
No time	7.52%	7.06%
Not useful	1.39%	0.44%
Difficulty in commuting	2.15%	1.73%
Not allowed by family	4.42%	3.70%
Not comfortable attending (All men in attendance)	0.64%	0.32%
Not invited	25.05%	32.82%
Someone else from household attends	2.15%	4.02%
Not able to pay fees	0.00%	0.00%
Total	100%	100%

### 2.3.5 Choice of arbitrator on irrigation-related issues

When asked whom female household members would approach first if there were issues with irrigation water (Table 12), the largest share of responses was “don't know”, amounting to 29% of responses for the entire sample. Around 16% of respondents in the entire sample named the community leader as their point of contact, 14% named the *jamoat* office and 11% named their family members. Again, no differences in responses are found between USAID and non-USAID households.

These responses suggest that many female household members are unclear of who to approach first when an issue arises, and among those who do know which individual to approach for resolution, women are more likely to turn to community leaders, *jamoat* authorities or members of their family before irrigation service providers. This may implicate that women more often trust and have stronger connections with those that are more closely involved in community affairs. This does not necessarily mean, however, that most women do not eventually approach either the WUA or *vodkhoz*. It is possible that women first approach the *jamoat* or members of their locale in order to receive backing before approaching irrigation service providers.

**Table 12 - First choice of arbitrator when issues with irrigation water arise**

	USAID (n=961)	Non-USAID (n=959)	Total (n=1920)
Don't know	14.79%	13.91%	28.70%
Neighbor	2.67%	2.60%	5.27%
Vodkhoz	1.61%	1.87%	3.48%
Jamoat	6.20%	7.92%	14.12%
WUA/LISP	1.77%	1.41%	3.18%
Local NGO	1.87%	1.61%	3.48%
International donor	0.00%	0.00%	0.00%
Government (district or jamoat)	0.42%	0.16%	0.58%
Mirob	4.22%	3.54%	7.76%
Community leader	7.19%	8.54%	15.73%
Family members	5.52%	6.09%	11.61%
Other	3.65%	2.24%	5.89%
<b>Total</b>	<b>50.05%</b>	<b>49.95%</b>	<b>100.00%</b>

## 2.4 Summary

The data analysis presented here suggests that both USAID and Non-USAID WUAs provide membership to nearly all female-headed farms in their command areas at the farm level; however, according to women at the household level, interaction with irrigation service providers—either WUAs or *vodkhoz* offices—is very limited. This limited interaction is demonstrated in the women’s non-attendance at meetings, low individual membership rate in their WUA, and the women’s preferred choice of arbitrator when issues with irrigation water might arise. Particularly as it relates to women’s first choice of arbitrator, it is interesting to note that the two institutions that are above all expressly designed for overseeing irrigation-related challenges, the WUA and *vodkhoz*, represent some of the lowest proportions chosen among households interviewed. This may reflect a lack of confidence among households in the ability of either institution to impact the irrigation challenges they face meaningfully.

## CHAPTER 3 - AGRICULTURE AND WATER MANAGEMENT IN HOMESTEAD PRODUCTION SYSTEM

### 3.1. Introduction

This chapter analyses the characteristics of the homestead production system and its related water management. Although it is not possible to quantify and to attribute specific impacts of recent institutional changes and infrastructure rehabilitations based on a single round of survey and descriptive statistics, differences between the treated and the control zones are checked and described.

In this chapter, a homestead production system is defined as a system of agricultural production by households based on their kitchen gardens and on their presidential plots. These plots are under the ownership of households and the plots' status therefore differs from that of the *dehkan* farms which belong to a commercial or market-focused production system. This definition is confirmed *a posteriori* in the following analysis, since most of the production from these two types of homestead plots is kept for self-consumption while production from *dehkan* farms is mainly sold.

The first part of the chapter focuses on characterising this homestead production system by understanding the role played by kitchen gardens and presidential plots in household livelihoods. The type and diversity of crops are also analysed with the underlying idea that a vibrant homestead production system contributes to food security and poverty reduction.

The second part of the chapter considers how water is managed in the homestead production system. The focus here is on water needs, the timing of irrigation, conflicts, water suppliers, and payments for and maintenance of infrastructure. In conducting this analysis, a key issue is the extent to which households and their homestead production systems (that are not themselves the core focus of the USAID-WUA intervention) can indirectly be affected by the creation of WUAs and by the related rehabilitation work on irrigation infrastructure.

### 3.2. Characteristics of the homestead production system

#### 3.2.1. Kitchen gardens and presidential plots

The target of the survey was households cultivating a kitchen garden, presidential plot or both. As mentioned in Chapter 1, the selection of the households was random but households not cultivating a household plot were discarded and replaced.

This sampling strategy reveals that 99% of the surveyed households cultivate a kitchen garden, 34% have a presidential plot and 14% have a *dehkan* farm (Table 13). Some significant differences (at less than the 1% level) can be noted between the treated and control zones. In treated villages, there is a higher percentage of households cultivating only their kitchen garden; but in control villages presidential plots and *dehkan* farms are more common.

This dependency on the kitchen garden can be underlined by noting that 57% of the households surveyed only own this type of plot; it is therefore their only source of agricultural production.

**Table 13 - Type of plots owned and cultivated plot areas by treatment (n=1920)**

	Mean	Std Dev.	Treatment value minus control value Coeff.	Std Err.
<b>Proportion of household owning...</b>				
Kitchen garden	0.99	0.11	0.014***	0.00
Kitchen garden only	0.57	0.49	0.14***	0.02
Presidential plot	0.34	0.47	-0.13*	0.02
Dehkan farm	0.14	0.35	-0.048***	0.02
Kitchen garden + Presidential plot	0.33	0.47	-0.12***	0.02
Kitchen garden + Dehkan farm	0.14	0.35	-0.048***	0.02
Presidential plot + Dehkan farm	0.06	0.23	-0.034***	0.01
Kitchen garden + Presidential plot + Dehkan farm	0.06	0.23	-0.035***	0.01
<b>Area cultivated, in hectares</b>				
Kitchen garden	1.30	1.08	0.44***	0.05
Presidential plot	1.53	1.03	0.27***	0.08
Dehkan farm	5.43	8.90	0.98	1.10
Kitchen garden + Presidential plot	1.80	1.44	0.34***	0.07

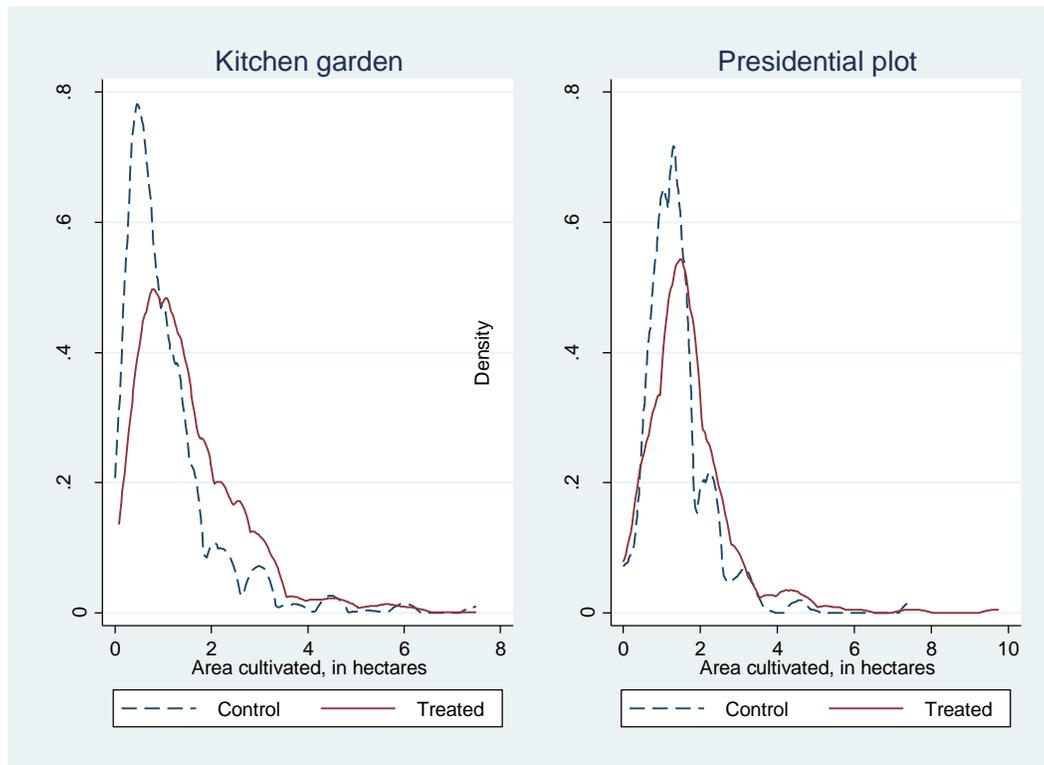
Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

In terms of the areas cultivated, households owning a kitchen garden have on average 1.3 hectares, but the distribution of responses reveals that 22% of those households have less than 0.5 hectares and 48% have less than 1 hectare. Presidential plots are generally larger with an average area of 1.53 hectares which, by comparison, is 3.5 times less than the average area of the *dehkan* farms.

The test for the differences in areas between the treated and the control villages, shows that households in treated villages have significantly (at less than the 1% level) bigger plots than the households surveyed in control villages. This is the case both for kitchen gardens and for presidential plots; for kitchen gardens the mean area is higher by 0.44 hectares in treated villages as compared to control villages and the difference is equivalent to 0.27 hectares for the presidential plots. When the densities of the areas in hectares are plotted separately for the treatment and control groups (Figure 1), the same observation is made. In this regression graph, the y-axis reports the frequencies of the values which are on the x-axis. The bold line reports the frequencies observed in the treatment group, and the dotted line reports the frequencies observed in the control group. The line for the control group is clearly squeezed to the left with lower values being more frequent. This result may mean that the villages treated by the USAID-FFP program were slightly wealthier in terms of their agro-ecological conditions, as reflected in available area of plots to cultivate.

**Figure 1 - Distribution of kitchen garden and presidential plot areas in hectares by treatment (n=1920)**



Source: Survey data collected by authors in 2016.

### 3.2.2. Sources of irrigation water

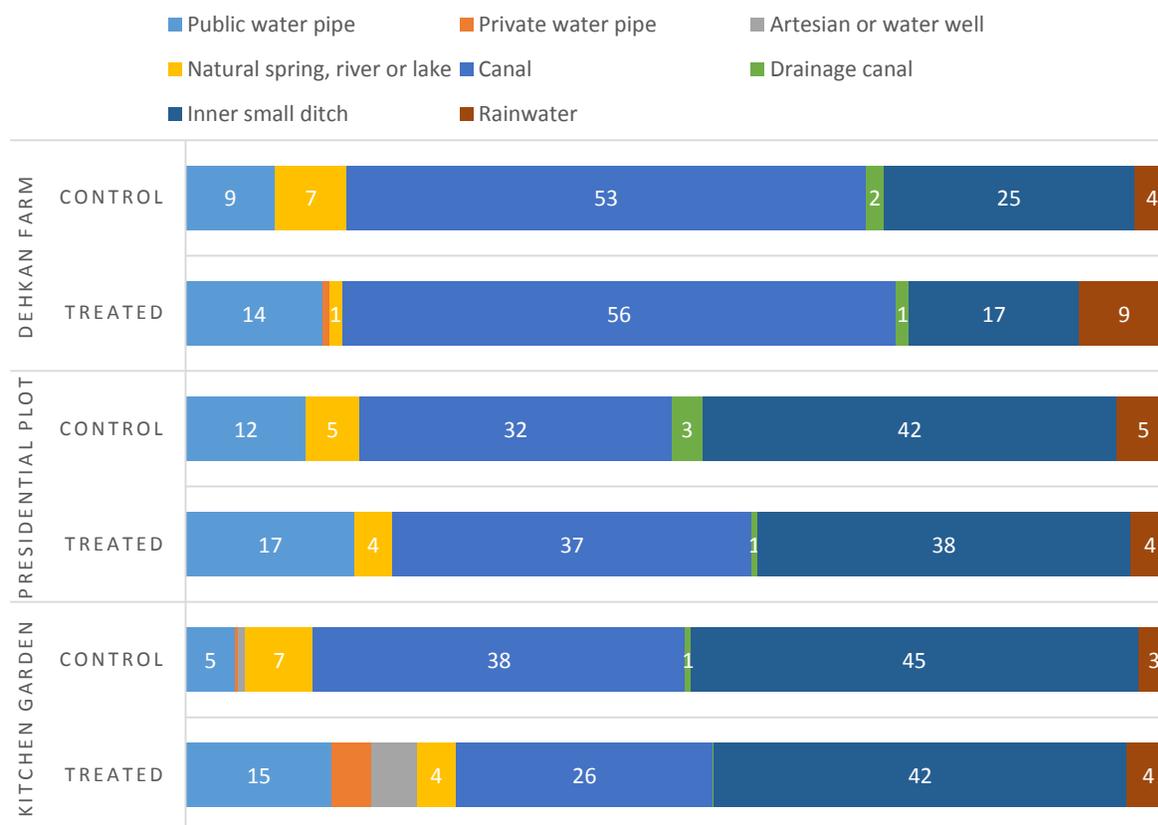
Canal water is essential as it is the most important source of irrigation. About 55% of the *dehkan* farms are irrigated mainly with canal water, as are 35% of the presidential plots and 32% of the kitchen gardens. The second most important source of water for irrigation is the small ditches (*juybor*) that run alongside the roads within villages, between fields, or through household compounds. They are used to irrigate 44% of the kitchen gardens, 40% of the presidential plots and 21% of the *dehkan* farms. Even if those small ditches are considered and named independently from the canals, technically they are generally connected to the main canals as the initial water source.

Alternate sources of irrigation water include that provided through a public pipe or a natural source of water (spring, river or lake). Access to these sources of water seems to be preferred to canal water when available, but this access depends on the infrastructure or the hydrology of the village. For example, in the *jamoat* of Nuri Vakhdat (Panj district) all the surveyed households use mainly piped water for irrigating their kitchen garden crops.

Figure 2 describes the main source of water used for irrigation by type of plot and treatment status. No clear difference can be found between treated and control locations. The main difference is the fact that several villages from the treated *jamoats* have access to public pipes and the percentage of household

using the canals for irrigating their kitchen garden and presidential plots is slightly higher in USAID treated locations as compared to counterfactual *jamoats*.

**Figure 2 - Sources of water by type of plot and treatment**



Source: Survey data collected by authors in 2016.

### 3.2.3. Crop diversity and crop choice

#### 3.2.3.1. Diversity of the crops cultivated

Whereas *dehkan* farms are often specialized on few market crops, one might expect the homestead plots to be more diversified to meet a household’s needs. This is indeed the case. From the data collected, on average each household cultivating a kitchen garden grows more than 8 types of crops (Table 14). When calculated by hectare, more than 10 types of crops are cultivated by households per hectare of kitchen gardens.

The difference between treated and control households is quite important, as in the control villages on average 3.5 additional crops are cultivated per hectare as compared to the situation in treated villages and this difference is significant at less than the 1% level. Yet this may result from the fact that kitchen

gardens are smaller in control areas and households therefore need to concentrate the crops that they need on smaller areas. And *de facto*, the difference in terms of total number of crops grown per kitchen garden between treated and control villages is relatively small (0.7 crops) and positive.

**Table 14 - Number of crops grown by type of plot and treatment (n=1920)**

		Mean	Std Dev.	Treatment value minus control value	
				Coeff.	Std Err.
Kitchen garden	Number of crops grown/plot	8.25	6.44	0.67**	0.30
	Number of crops grown/hectare cultivated	10.71	12.14	-3.54***	0.55
Presidential plot	Number of crops grown/plot	1.58	1.43	-0.43***	0.11
	Number of crops grown/hectare cultivated	1.41	1.55	-0.53***	0.12

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

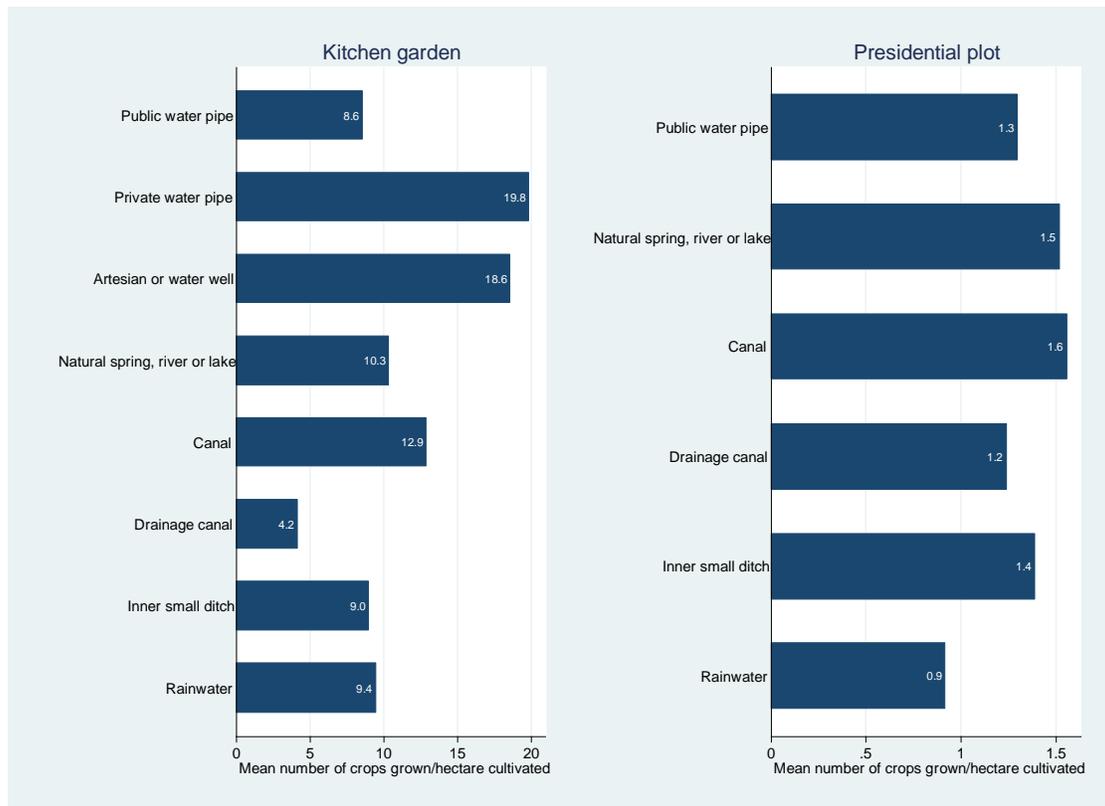
When considering the presidential plots, an average of 1.6 crops is grown on each plot corresponding to 1.4 crops per hectare. The presidential plots are therefore largely specialized and households do not use these plots to diversify their production. The production of presidential plots is consequently not an extension of the kitchen gardens even if other complementarities (for inputs, labor for example) can probably be observed.

Both the number of crops grown per plot and the per hectare number of crops grown in presidential plots are higher for households in control villages than for households in treated villages and the two differences are significant at the 1% level. Again, the fact that kitchen gardens and presidential plots are relatively smaller in control areas may explain the choice to cultivate a slightly higher number of crops in those areas for control households.

The number of crops grown is then analysed for each source of water (Figure 3). When kitchen gardens are irrigated by an independent source of water which can be a private pipe or a well, households are able to cultivate more crops per hectare. Households using a private pipe for irrigating their kitchen gardens cultivate almost 20 types of crops and those who use a well cultivate almost 19 crops. But water from canals seems also to represent an interesting source of irrigation as compared to other sources since households using canals cultivate 13 crops per hectare which is much higher than households using rainwater, ditch water, springs, rivers or even public pipes.

In the case of the presidential plots, the highest number of crops per hectare is associated with irrigation from canals. Other sources of water for irrigating presidential plots are less common and result in less diversified cropping patterns.

**Figure 3 - Number of crops grown by source of irrigation water and treatment**

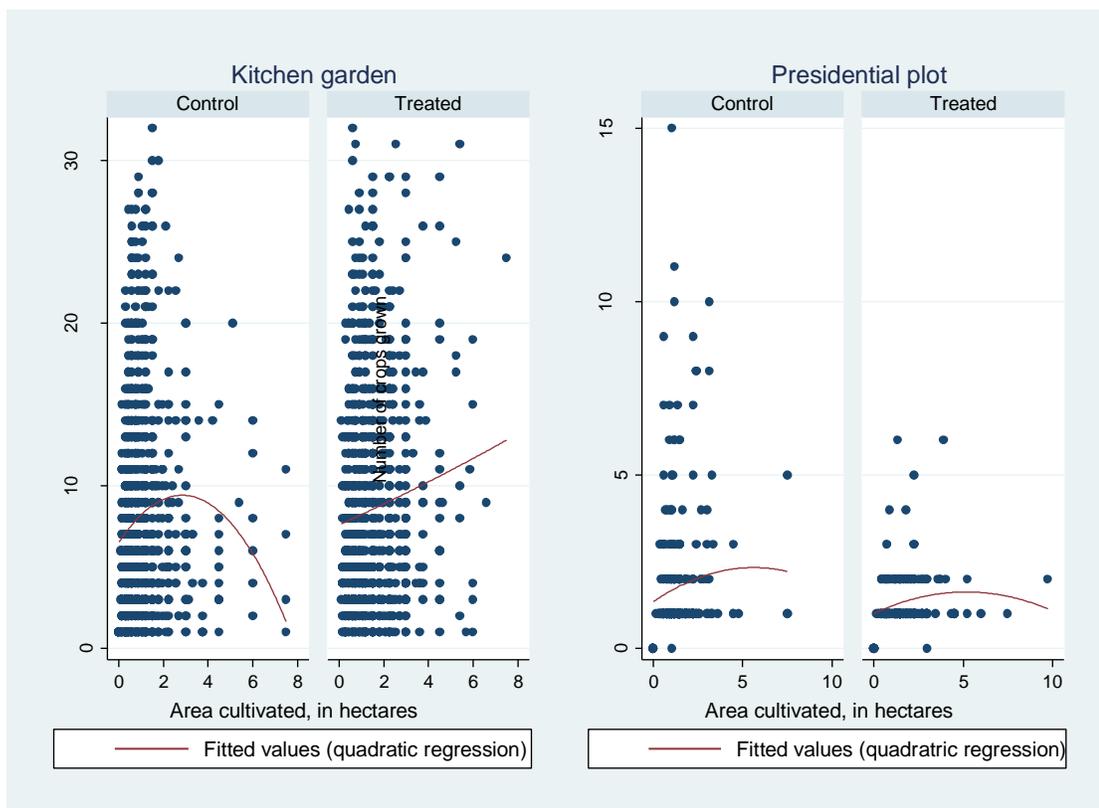


Source: Survey data collected by authors in 2016.

Figure 4 is used to understand the relation between the number of crops grown and the area under cultivation both for kitchen gardens (left) and presidential plots (right). Each observation is plotted on the graph and the lines show the quadratic relation between the two variables. In the case of kitchen gardens for the control group, there is a concave curve which means that, at first, with larger plots households cultivate more crops, but then a turning point is reached and households with larger areas become more specialized. Interestingly, this scenario is not observed in the treated areas. On the contrary, there the relationship is consistently positive (i.e., households with larger plots consistently choose greater diversifying of crop types.)

In the case of presidential plots, the concave curves are also established both for treated and control households but the turning point is reached at relatively high values of the areas. Specialization to one or a few crop types is consequently relatively rare and happens only for few households with very large areas of presidential plots.

**Figure 4 - Number of crops grown and areas under cultivation by treatment**



Source: Survey data collected by authors in 2016.

### 3.2.3.2. Types of crops cultivated

The data displayed previously show the large number of crops cultivated in the homestead production system, and this diversity is confirmed by examining the range of crop types that are cultivated. Table 15 reports the types of crops that are cultivated in kitchen gardens or in residential plots by more than 10% of the households surveyed. This generates a list of 29 crops. To give only a few examples of crops commonly found in kitchen gardens, observe that capsicum is cultivated by 45% of the households, tomatoes are found in 75% of the kitchen gardens, potatoes in 64% of the cases and even apricots in 38%. These crops that are commonly cultivated in the kitchen gardens are also crops that are very commonly consumed by these households. The diversity of crop types is much lower in residential plots which are used for wheat in 39% of the cases but also for clover (20%), feed corn (13%) and more rarely for vegetables.

The difference between treatment and control areas have been assessed but there are no significant differences in terms of the percentages of households cultivating these different crops.

**Table 15 - Percentage of households growing different crops and percentage kept for self-consumption**

	Kitchen gardens (N=1897)			Presidential plots (N=651)		
	Percentage of households growing crops	Percentage of the production kept for self-consumption	Percentage of household not consuming their entire production	Percentage of households growing crops	Percentage of the production kept for self-consumption	Percentage of household not consuming their entire production
Maize	27.57	93.10	10.90	16.13	89.52	12.38
Wheat	7.70			38.56	93.56	28.9
Kidney beans	34.32	95.91	8.76	6.91		
Cabbage	10.28	90.01	18.46	0.92		
Capsicum	45.49	95.09	8.92	4.61		
Cucumber	41.33	94.86	9.82	2.76		
Eggplant	34.32	96.89	7.07	2.76		
Tomato	74.75	94.57	11.85	7.83		
Pumpkin	26.36	96.13	9.00	2.00		
Green herbs	48.81	96.00	8.21	1.69		
Beetroot	11.86	97.91	4.44	0.61		
Garlic	18.13	95.86	8.43	0.77		
Onion	32.63	94.74	10.50	4.92		
Potato	63.94	93.31	15.00	9.22	86.50	21.67
Carrot	20.03	90.67	17.89	2.15		
Apple	19.08	93.36	12.54	0.00		
Apricot	37.90	94.33	12.10	0.15		
Grapes	23.62	94.94	8.93	0.15		
Cherry	20.51	94.60	10.80	0.00		
Peach	21.98	94.01	11.03	0.15		
Persimmon	20.30	92.69	13.77	0.00		
Quince	11.39	93.38	10.19	0.00		
Sweet cherry	10.81	92.10	11.71	0.15		
Walnuts	17.24	89.37	16.51	0.00		
Almonds	14.65	84.71	22.30	0.15		
Mulberry	16.18	95.21	8.14	0.00		
Clover	5.59			19.66	85.98	15.62
Feed corn	10.81	96.98	3.90	13.52	92.33	9.10
Flowers	12.70	98.76	1.24	0.00		
All crops (mean)		92.01	12.73		85.28	13.31

Source: Survey data collected by authors in 2016.

In addition to this long list of crops, one can gain an overall perspective on production practices by categorizing these crops by type. In Table 16, crops are grouped into cereal and surface vegetables, which are mostly harvested in summer, and into root vegetables harvested in autumn/winter, fruits and fodder.

Note that 84% of the surveyed households cultivate vegetables, 74% cultivate root vegetables and almost 60% cultivate fruits in their kitchen gardens. Those different crops are cultivated on the same plots but in different seasons, which means especially for vegetables and root vegetables that the land is cultivated several times per year. Cereals are found in 33% of the cases and fodder in 16% of the kitchen gardens. These later two crop types are more commonly cultivated in kitchen gardens from treated areas than in control areas and the differences are significant at a level of less than 1%. Here again the size of the kitchen gardens can be an explanation; with relatively larger plots, households from treated villages choose to allocate space for growing cereals and fodder.

In presidential plots, cereals and fodder are prominently cultivated, with 57% and 35% of the households cultivating these types of crops, respectively. Vegetables and root vegetables are cultivated in only 10% of the cases and fruits are grown in less than 2% of the presidential plots surveyed. Here again, there is a significant difference between the practices of treated and control households. Vegetables and root vegetables are significantly (1%) more often grown in control locations than in the treated locations, with a 11 to 12 percentage point difference while fodder is more often cultivated in treatment locations. With limited areas in their kitchen garden, perhaps some households from the control villages have started to cultivate vegetables on the presidential plots.

These results present some clear differences in the crop choice between kitchen gardens and presidential plots. More labor-intensive, and water-intensive crops are cultivated close to the house which facilitates the work on the plot, the harvest and also helps to avoid theft. Presidential plots, which are often further away, are predominantly dedicated to extensive cultivation like cereals and fodder which require less labor and less water.

**Table 16 - Percentage of households growing different types crops and number of crops by type by treatment**

	Kitchen gardens (N=1897)				Presidential plot (N=651)			
	Mean	Std Dev.	Treatment value minus control value		Mean	Std Dev.	Treatment value minus control value	
			Coeff.	Std Err.			Coeff.	Std Err.
<b>Percentage of households growing different type of crops</b>								
Cereals	33.47	47.20	13.49***	2.15	56.99	49.55	1.62	3.96
Vegetables	84.19	36.50	3.2**	1.67	10.14	30.21	-11.96***	2.37
Root vegetables	72.85	44.48	-1.57	2.04	10.75	31.00	-11.08***	2.44
Fruits	59.52	49.10	3.38	2.25	1.69	0.51	1.57	1.03
Fodder	15.66	36.34	10.19***	1.65	35.02	47.74	11.81***	3.79
<b>Number of crops grown by type</b>								
Number of cereals	0.36	0.54	0.15***	0.02	0.64	0.61	0.02	0.05
Number of vegetables	2.84	2.11	0.00	0.10	0.23	0.82	-0.27***	0.06
Number of root vegetables	1.56	1.48	0.04	0.07	0.18	0.59	-0.22***	0.05
Number of fruits	2.51	3.10	0.05	0.14	0.02	0.23	-0.03	0.02

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

### 3.2.4. Self-consumption

For all the crops listed in Table 15 and commonly cultivated in the kitchen gardens and in the presidential plots, the harvest is almost entirely self-consumed. There is rarely more than 5% of the harvest that is not consumed by the household. If we exclude seeds—which have to be kept for the next growing season—and a small percentage of gifts or exchanges with the relatives or neighbors, there is a very small part of the harvest which is sold. This means that the agricultural production directly contributes to the food security of the household. However, this can also denote a certain vulnerability, such as when the harvests are at risk due to climate hazards, for example.

Yet, on average 13% of the households don't consume their entire production themselves. This results is consistent with the information given on the main sources of income: 11% of the households mentioned the crops sales from kitchen gardens and presidential plots as their first source of income. The sale of products from kitchen garden and presidential plot even ranks third after remittances (32%) and pensions (13%).

Therefore, even though a very small amount of harvest is sold, this still forms the primary or only source of liquid capital for some households. This suggests that homestead production is not only important for the food security but is also an essential source of monetary income for some households, even if the amount earned may be minimal.

Differences between treated and control villages have been checked and no difference can be identified on the self-consumption behaviour.

## 3.3. Water access for the homestead production system

### 3.3.1. Water needs and water availability

The water needs of the households have been compared to the water availability by asking respondents for each month if they usually require water for irrigation for each plot and if water is available. From the responses, a number of comparisons may be drawn.

Most of the households need water for irrigation of their kitchen gardens from March to September. The period of peak demand is slightly different for the treated and control groups. Whereas in the treated locations, more than 50% of the households continuously need water from March to September, in the control locations water is required by more than 50% of the household from April to July only.

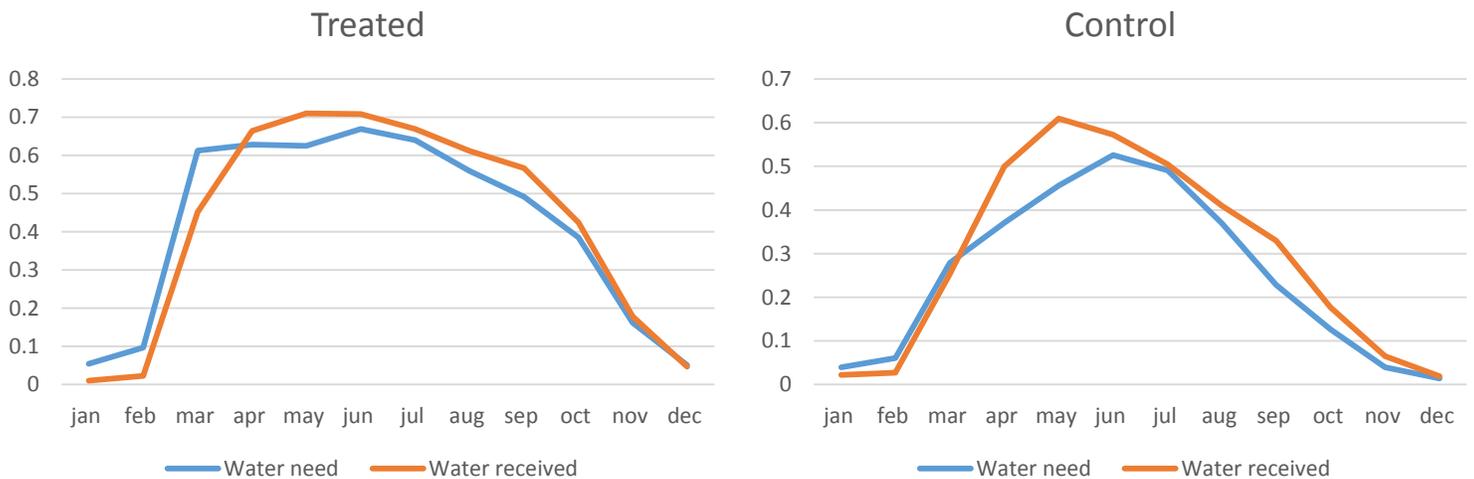
When the curve (Figure 5) for the needs and for the water received are compared, no major gaps are identified which mostly means that households adapt their requirements and therefore their cropping choices to the availability of water. It is only in March for the group of treated households that the percentage of households requiring water exceeds the percentage of households receiving water. These households would therefore need to receive water earlier in the season to start the cultivation at the end of winter. The percentage of households receiving water for irrigation of their kitchen gardens is higher in treated villages than in control villages. In treated villages, water is received by more than 60% of the

surveyed households from March to September. But in the control villages, it is only in May that 60% of the households receive water and for the other months more than half of the households do not have access to irrigation. In summary, in treated locations more households have access to irrigation for their kitchen gardens and these households have access to water for a longer period.

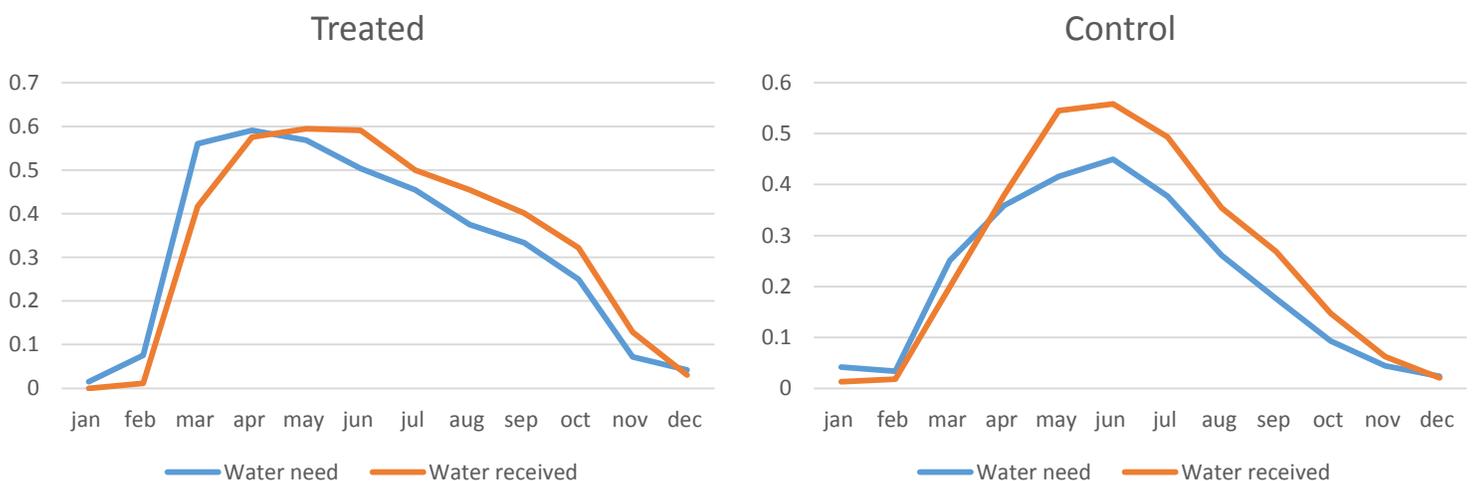
The same patterns are observed for the presidential plots. The peak season of water availability lasts longer in treated zones and a higher percentage of households receive water during this period as compared to the control group.

**Figure 5 - Proportion of households with water needs and water received for each month by treatment and type of plot**

KITCHEN GARDENS



PRESIDENTIAL PLOTS



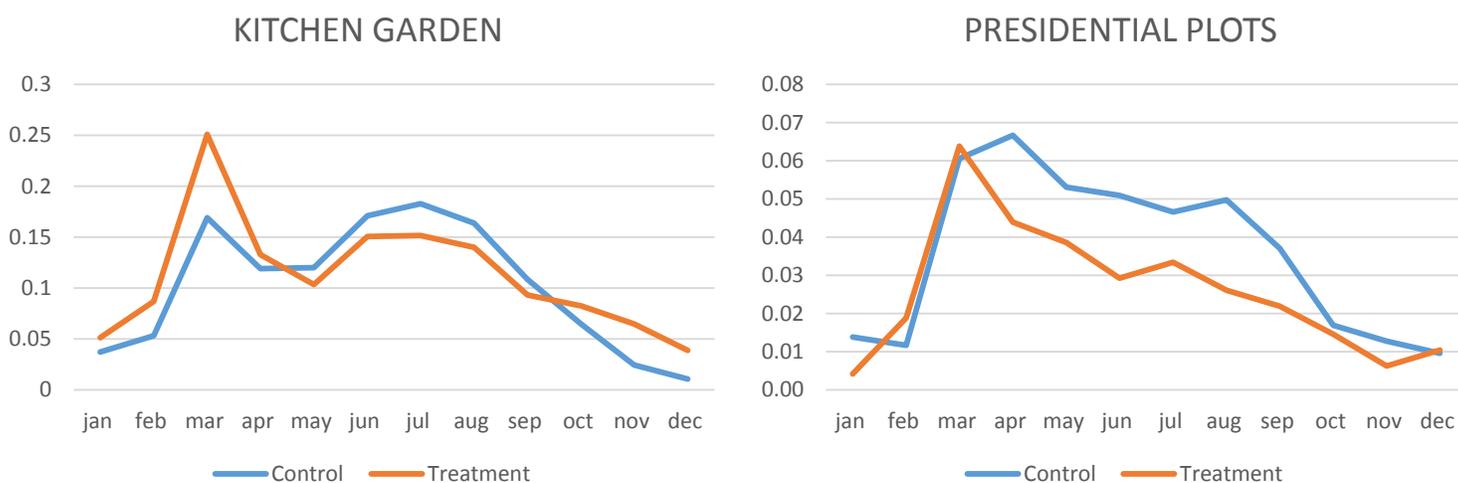
Source: Survey data collected by authors in 2016.

Figure 6 focuses on households for whom the water needs do not match the water received, including households who need water but who do not receive any for each month. On average, 56% of the

households have at least one month for which water needs for the kitchen gardens are not satisfied during the year, and in the case of the presidential plots, the comparable number is 53%.

Even so, the scenarios are different for each season and between treated and control locations. From May to September, in the peak season of irrigation for kitchen gardens, a higher percentage of households from the control group has unmet water needs, whereas for the rest of the year it is in the treated group that the higher percentage of unmet water needs is found. Here again, since the water access has likely been improved as a result of program interventions and other reforms, one might assume that for households in treated zone, new water needs emerged beyond the peak season or that their constraints related to water access was more severe than in control zone and have been partially solved in peak season only.

**Figure 6 - Proportion of households who need water but who do not receive any for each month by treatment and type of plot**



Source: Survey data collected by authors in 2016.

In the case of presidential plots, the difference between the treated and control households is clear and significant both for the whole year and for the peak irrigation season (Tables 17): the proportion of households with unmet water needs is higher in control locations than in treated areas.

These figures on household satisfaction with the months when water was available can be linked to their responses on their overall satisfaction related to the quantity of water received (Figure 7). On average, 33% of the sampled households were unsatisfied or very unsatisfied by the quantity of water provided for their kitchen gardens in control locations versus 31% in the treated zone, and this difference is not significant. For the presidential plots, 32% and 28% of the households are not satisfied with the water quantity received as reported by the control and treated households, respectively.

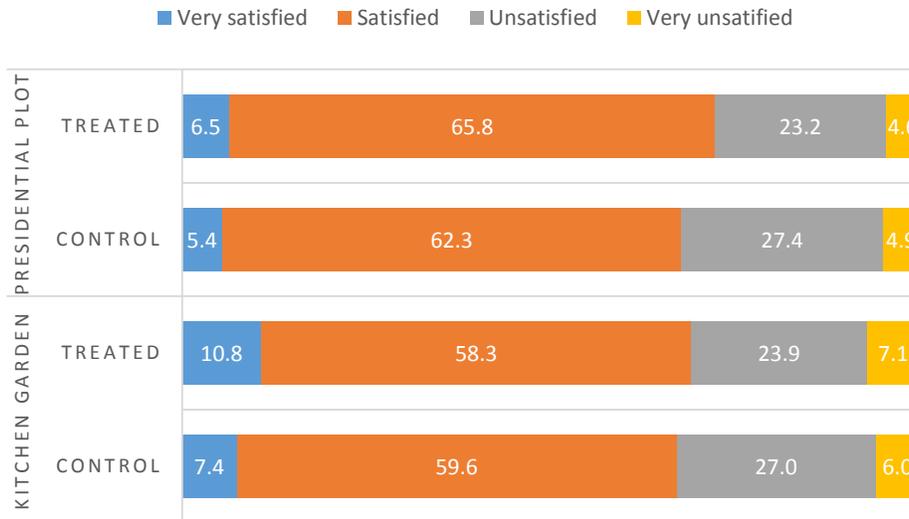
**Table 17 - Unmet water needs**

	Kitchen gardens (N=1897)				Presidential plots (N=651)			
	Mean	Std Dev.	Treatment value minus control value		Mean	Std Dev.	Treatment value minus control value	
Coeff.			Std Err.	Coeff.			Std Err.	
Percentage of households who need water but do not receive any for each month	10.08	13.49	1.16*	0.62	3.48	11.67	-1.13**	0.53
Percentage of households who need water but do not receive any in peak season (April-September)	13.64	22.75	-1.55	1.04	4.58	15.28	-1.99***	0.70

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

**Figure 7 - Satisfaction with the quantity of water for irrigation received**



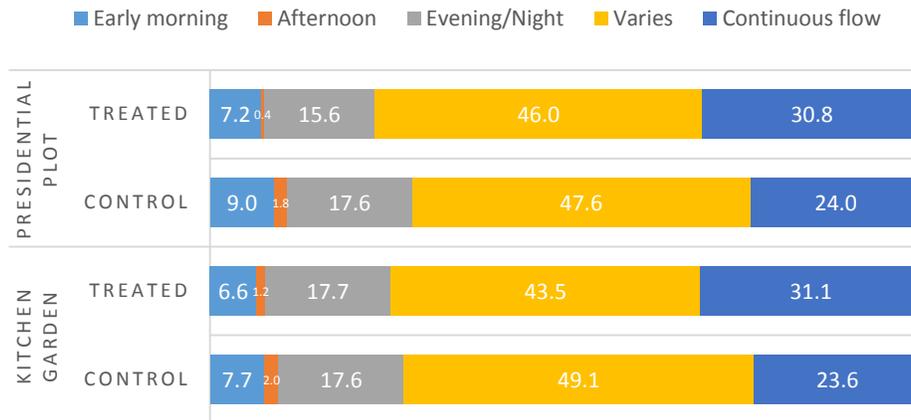
Source: Survey data collected by authors in 2016.

### 3.3.2. Timing of water supply

This section addresses the timing of water supply, where previous qualitative work showed that the time of the day at which water for irrigation is available can be a constraint, especially for women.

Actually, for almost half of the households, respondents were unable to specify the time at which the water usually starts to flow as it varies (Figure 8). About 17% of the respondents usually receive their water allocations in the evenings or during the nights. On average, 45% of the respondents consider that the time at which the water begins to flow is not convenient to them (Table 18). No clear patterns can be established to differentiate these responses between the treated and the control villages.

**Figure 8 - Time of the day water begins to flow (percentage of households)**



Source: Survey data collected by authors in 2016.

**Table 18 - Information about and satisfaction with the timing of water supply**

	Kitchen gardens (N=1897)				Presidential plots (N=651)			
	Mean	Std Dev.	Treatment value minus control value		Mean	Std Dev.	Treatment value minus control value	
			Coeff.	Std Err.			Coeff.	Std Err.
Percentage of households informed in advance of the day irrigation water will arrive	22.72	41.91	-1.10	1.93	20.77	40.60	0.88	3.25
Percentage of households for whom not knowing in advance the day water will arrive is problematic	42.16	49.40	6.92***	2.58	35.92	48.02	2.13	4.32
Percentage of households for whom the time of the day water begin to flow is inconvenient	45.44	49.80	-0.12	2.29	42.62	49.49	-0.69	3.96

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

Apart from the time, the day can also be important to be know in advance, such as to plan for field activities and to prepare the land for planting. Yet, only 23% of the households know in advance which day the water will arrive for irrigation of kitchen garden and 21% in the case of presidential plots. About 42% of the households consider this lack of information to be a problem for the kitchen garden owners.

### 3.3.3. Water conflicts

Although the focus of the survey was not on water governance, it provided an opportunity to learn about the degree of community conflicts related to water. Indeed, with the creation of WUAs, one might expect that water conflicts would be reduced, as farms would have an arena to discuss their water rights, and WUAs would legitimize the allocation of water.

When respondents were asked if water intended for their plots has ever been stolen by neighbors, 21% of them answered positively for the kitchen gardens and 25% of them did the same for the presidential plots (Table 19). Similarly, some of the respondents admitted that they had previously taken water intended for their neighbors, either for use in their kitchen gardens (8% of respondents) or their presidential plots (13%). Considering the likelihood of under-reporting this behaviour, these figures are relatively high and confirm that water is commonly contested and that the quantity of the resource is far from satisfying all current needs.

Interestingly, the difference between the treated and the control group is significant (at less than the 1% level) and the water thefts are more commonly reported in treated villages than in control villages, and this is so for both for kitchen gardens and presidential plots. Therefore, the creation of WUAs has not yet resolved the conflicts over water allocation within the villages (which was not specifically their mandate). An open question is whether improving households' access to water might have intensified conflicts, as householders seek to take ownership of the potential benefits (quantity of water available, timeliness of water access, etc.).

**Table 19 - Thefts of water intended for household irrigation**

	Kitchen gardens (N=1897)				Presidential plots (N=651)			
			Treatment value minus control value				Treatment value minus control value	
	Mean	Std Dev.	Coeff.	Std Err.	Mean	Std Dev.	Coeff.	Std Err.
A neighbor has previously taken (or stolen) water intended for the household plot without permission	21.14	40.84	3.99**	1.87	24.77	43.20	8.85***	3.44
Water taken without permission or stolen from a neighbor by the surveyed household	8.49	27.88	1.66	1.28	12.92	33.57	3.20	2.68

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

### 3.3.4. Water suppliers

The previous farm survey established that confusion often exists about the identity of water supplier and about payments for water. In this household survey, women respondents were specifically asked if they

know who provides water to their plots. In that case, the question was not concerning the entire household but only the respondent herself. Only 32% of them responded positively for the kitchen gardens and 36% for the presidential plots (Table 20). A large majority of the women therefore do not have a clear idea of who provides the water which is used to irrigate their crops.

In addition, we note that the difference is important and significant between the treated and the control villages. In the control villages, 36% of the women respondents know who the water provider is whereas only 28% have this information in the treated villages. Based on these figures, it seems possible that the creation of WUAs has perpetuated or increased confusion on the specifics of water provision, underlining potential value to householders from further communication and information sharing.

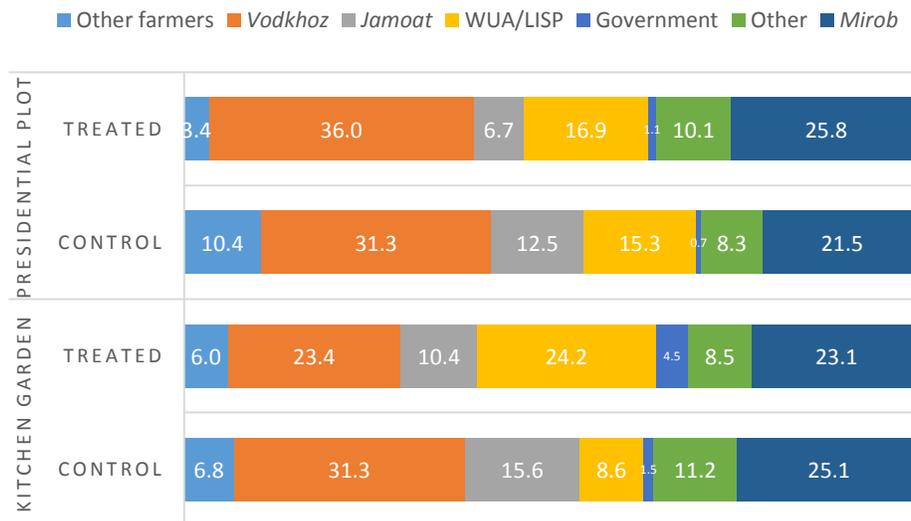
**Table 20 - Information on water provision**

	Kitchen gardens (N=1897)				Presidential plots (N=651)			
	Mean	Std Dev.	Treatment value minus control value		Mean	Std Dev.	Treatment value minus control value	
			Coeff.	Std Err.			Coeff.	Std Err.
Percentage of women knowing who provides their water	32.05	46.68	<b>-7.89***</b>	2.14	35.85	47.99	-3.37	3.84

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

**Figure 9 - Perception on who is the water supplier (percentage of households)**



Source: Survey data collected by authors in 2016.

Furthermore, even for those who think that they know who provides the water to their plots, there remains a large variety in the responses, even within a same village (Figure 9). One third of the women

respondents consider that the water is supplied by the *vodkhoz*, even when a WUA has been created and performs that function. Also, more than 20% of the respondents said that water is supplied by the *mirob*. This result underlines the importance given to the personal relations. Whether the *mirobs* are formally employed by the *vodkhoz* or by the WUAs household's, household members interact with them. Household members see the *mirob* operating the gates and therefore consider that decisions about water supply and provision is in their hands.

### 3.3.5. Water payments

According to this household survey, 81% of the households need to pay for the water provided to their kitchen garden and 77% need to pay for the water provided to their presidential plot<sup>4</sup> (Table 21). It is worth noting that more households need to pay in the treated zones compared with the control zones. This difference is about 11 percentage points and is significant (at less than the 1% level). The creation of community-managed and locally based WUAs has indeed the potential to improve the collection of fees both for members (*dehkan* farms) and non-members.

**Table 21 - Water payments**

	Kitchen gardens (N=1897)				Presidential plots (N=651)			
	Mean	Std Dev.	Treatment value minus control value		Mean	Std Dev.	Treatment value minus control value	
			Coeff.	Std Err.			Coeff.	Std Err.
Percentage of household who need to pay for water use	80.71	39.47	10.85***	1.80	76.92	42.16	-0.84	3.37
Average amount paid for water in 2015 per hectare (for those who paid) (TJS/hectare)	81.31	205.34	-41.04***	11.54	40.67	61.74	10.55*	6.50

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

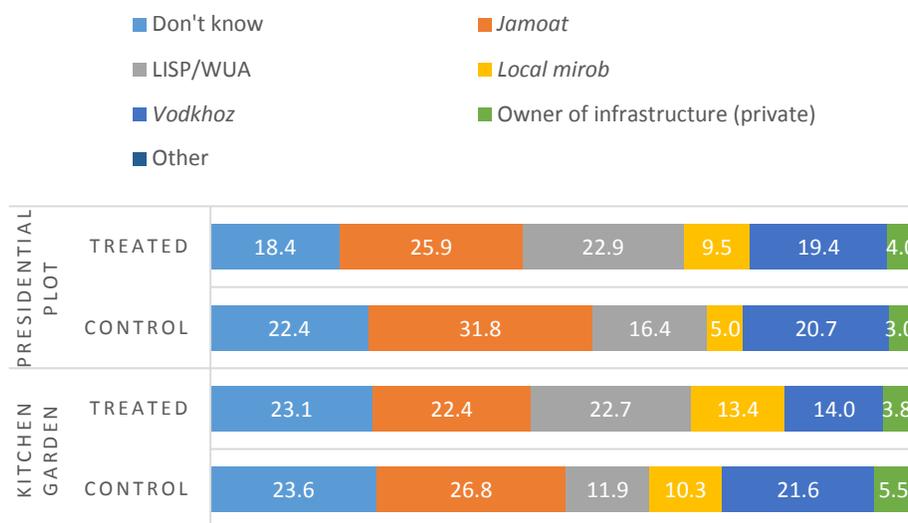
When calculated on a per-hectare basis, the average amount paid for accessing water is 81 TJS for the kitchen gardens and 41TJS for the presidential plots. An important difference in the average amount to be paid for kitchen garden water usage is established between the treated and the control villages. In the treated locations, households pay on average 62 TJS per hectare versus 103 TJS per hectare in control locations.

A variety of responses suggests a certain degree of confusion about the party to whom the payments for water are made (Figure 10). First, 23% of the women respondents did not know to whom exactly they

<sup>4</sup> The question did not distinguish between households who actually pay for irrigation water and households who have arrears on their payments, it was only asked if they need to pay.

gave the fees. Some 24% of the respondents said that the fees were paid to *jamoats*, yet *jamoats* usually do not have a direct role to play in water provision or fees collection for water and only *vodkhoz* and WUAs (where existing) should have this role. These figures indicate some confusion in household and especially women perceptions about the responsibilities of the different institutions and also maybe about the multiple functions held by some community leaders.

**Figure 10 - Perception on whom are the fees paid to (percentage of households)**



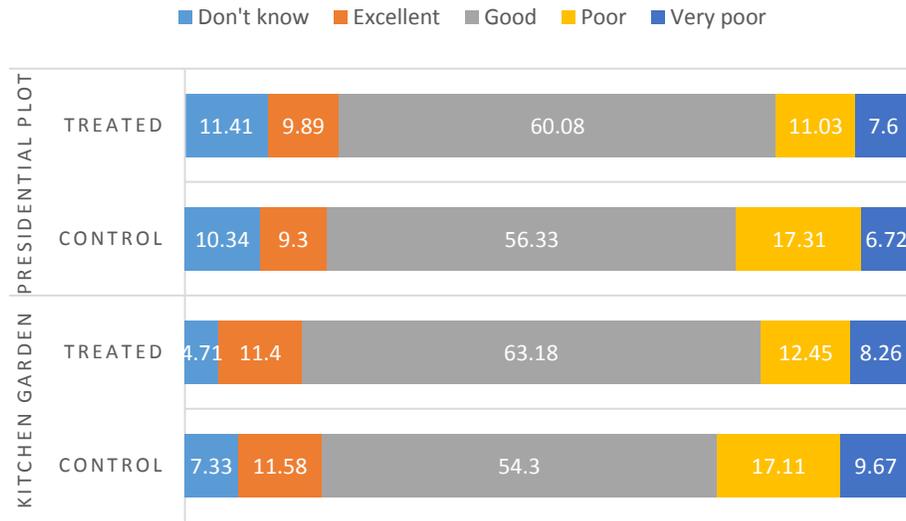
Source: Survey data collected by authors in 2016.

### 3.3.6. Quality and maintenance of the water infrastructure

The water infrastructure (i.e., mostly the canals) which supplies water to the plots is considered to be of poor or very poor quality by 24% of those surveyed who use this infrastructure for their kitchen gardens (Figure 11). The rehabilitation work undertaken in the treated areas may be contributing to a higher percentage of households rating the infrastructure as 'good' in treated villages (60% in treated villages, 56% in control villages) and a lower percentage of 'poor' and 'very poor' ratings (18% in treated villages, 24% in control villages). The differences are significant and also hold true in the case of the presidential plots. Yet the percentage of households (on average 11%) considering their water infrastructure to be in excellent condition is not different in treated and in control areas.

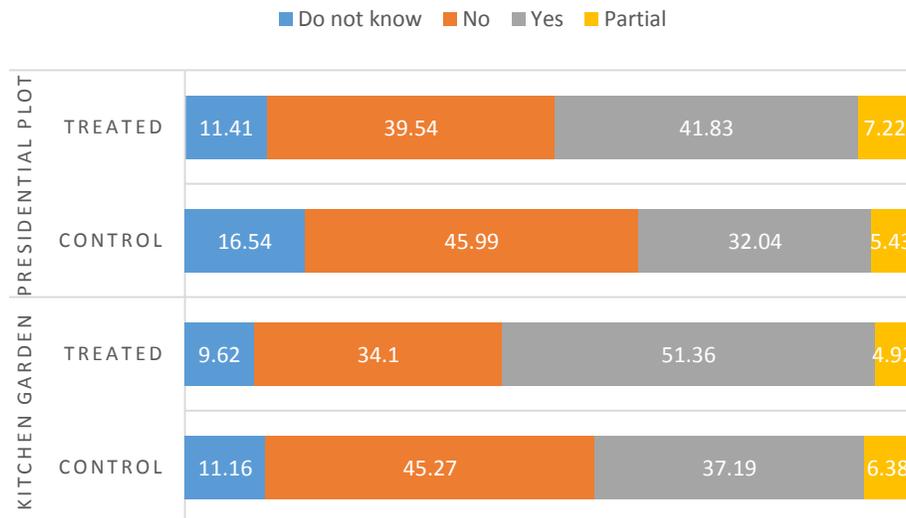
As expected, the rehabilitation of water infrastructure has been more commonly undertaken in treated areas than in control areas (Figure 12). Yet, 40% of the surveyed households in the treated villages still consider that the canals supplying water to their kitchen gardens have not been rehabilitated in the last five years and 34% consider the same thing in the case of their presidential plots. Although these figures are quite high in treated areas, one should recall that the focus of the program was on *dehkan* farms, which could explain the perception that a large number of canals providing water within the villages have not been rehabilitated.

**Figure 11 - Perceptions of women respondents on the quality of water infrastructure (percentage of households)**



Source: Survey data collected by authors in 2016.

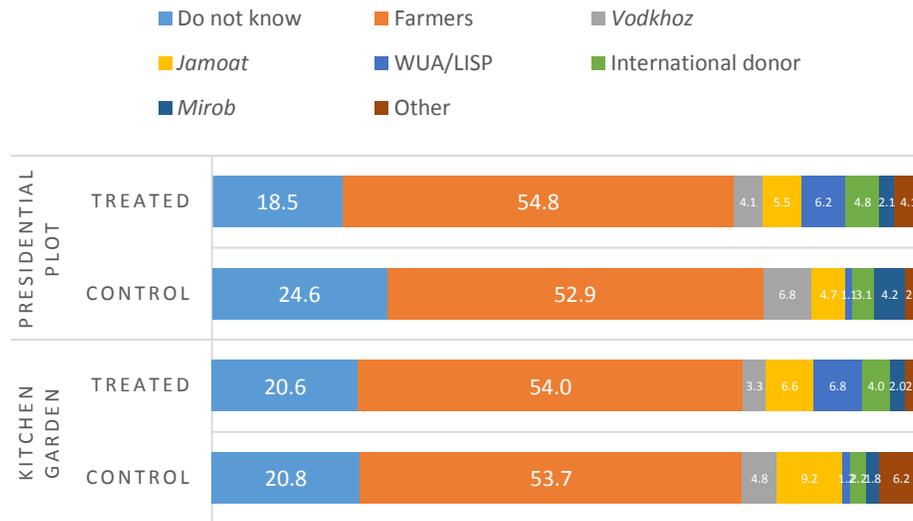
**Figure 12 - Rehabilitation of water infrastructure in the last five years (percentage of households)**



Source: Survey data collected by authors in 2016.

It is also interesting to note that a large number of respondents (22%) don't know who made the repairs and 54% of them consider that the rehabilitation has been done by the farmers themselves (Figure 13). As noted earlier, the variety of the institutions mentioned even within the same village as undertaking the rehabilitation of the water infrastructures confirms the lack of information and clarity on roles and responsibilities of the different stakeholders.

**Figure 13 - Perception on who made the repairs (percentage of households)**



Source: Survey data collected by authors in 2016.

**Table 22 - Labor and cash contributions to maintenance of water infrastructure**

	Kitchen gardens (N=1897)				Presidential plots (N=651)			
	Mean	Std Dev.	Treatment value minus control value		Mean	Std Dev.	Treatment value minus control value	
			Coeff.	Std Err.			Coeff.	Std Err.
Percentage of households not contributing to maintenance with labor	23.41	42.35	1.74	1.94	23.04	42.14	9.03	3.35
Person-days contribution to maintenance in 2015 (for those who contributed)	5.36	10.85	1.19**	0.57	5.81	18.59	1.87	1.72
Percentage of households not contributing to maintenance with cash payments	87.61	32.95	5.78***	1.51	91.86	27.37	-0.32	2.19
Cash payments (TJS) contribution to maintenance in 2015 (for those who contributed)	143.40	319.57	-120.93***	42.15	35.06	106.62	7.81	30.41

Source: Survey data collected by authors in 2016.

Note: The column labelled "Coeff" reports the treatment group value minus the control group value. The Column labelled "Std Err" reports the standard error of the t-test. \*\*\* implies that the difference is significant at 1%; \*\* implies that the difference is significant at 5%; \* implies that the difference is significant at 10%.

We finally focus on the contribution of households to the maintenance of water infrastructure (Table 22). On average, 77% of the households contributed to maintenance in 2015 with provision of their own labor. They spent more than five person-days working on the maintenance of canals that provide water to their kitchen garden and almost six person-days for the maintenance of canals supplying water to their presidential plot. The number of days is slightly higher in the case of the treated households and the difference is significant at the 5% level.

Contributions in cash are rarer than contributions in labor since only 12% of the households gave cash for the maintenance of canals for their kitchen garden, as did 8% of households in the case of the presidential plots. Here again the difference between treated and control zone is positive and significant: cash payments for maintenance of the infrastructure are more commonly found in treated areas. Yet when the value of the contribution is considered, the average amount contributed is significantly lower in treated villages than in the control group.

### 3.4. Summary

The main results highlighted in this chapter are as follows:

- Kitchen gardens (owned by 99% of the surveyed households) and to a lower extent presidential plots (owned by 34% of the surveyed households) are essential for rural households even if the areas actually cultivated are relatively small. About 57% of the households surveyed own only a kitchen garden, and this land serves as their only source of agricultural production.
- The areas of kitchen gardens and presidential plots are generally larger in treated villages than in control villages.
- As in the case of *dehkan* farms, the irrigation of kitchen gardens and presidential plots is largely dependent on irrigation canals. The same source of irrigation is generally used for the homestead production and for the *dehkan* farms.
- More than 12 types of crops are cultivated per hectare on the kitchen gardens in the control *jamoats* whereas in the treated villages on average 9 types of crops are cultivated per hectare. Presidential plots are less diversified with on average 1.4 types of crops cultivated per hectare.
- Households generally cultivate a combination of different crops and the land is used for at least two rounds of cultivation per year. About 84% of the surveyed households cultivate vegetables, 74% cultivate root vegetables and almost 60% cultivate fruits in their kitchen gardens. With relatively larger plots, households from treated villages allocate space for growing cereals and fodder. In presidential plots, cereals and fodder are the principal crops.
- Production from the kitchen gardens and from the presidential plots is almost entirely kept for self-consumption yet crop sales are an essential source of income for about 10% of the households.
- The peak season for water needs is from March to September. In treated locations more households have access to irrigation for their kitchen garden and they have access to water for a longer period (of months per year) than in control areas. In the peak season of irrigation, a higher percentage of households from the control zone have unsatisfied water needs, yet for the rest of the year the treated villages have the higher percentage of unsatisfied water needs.

- Half of the households' respondents were unable to specify the time (of day) at which the water usually starts to flow, as it varies. About 17% of the respondents usually receive water in the evenings or during the night. About 23% of the households know in advance on which day the water will arrive for irrigation of their kitchen gardens.
- About 21% of the kitchen garden owners faced water theft and the phenomenon is more often reported in treated villages than in control villages, both for kitchen gardens and for presidential plots.
- The large majority of the women have no clear idea on who provides the water which is used for irrigation of their crops: in control villages, 36% of the women respondents know who the water provider is whereas only 28% have this information in the treated villages. In addition, many of the respondents who said that they know who provide the water gave inaccurate answers when asked to cite who it is.
- About 81% of the households need to pay for the water provided to their kitchen garden and 77% need to pay for the water provided to their presidential plot. More households need to pay in the treated zone as compared to the control zone. Some confusion exists about the recipients of the payments for water; 23% of the respondents did not know to whom exactly they gave the fees.
- Rehabilitation of water infrastructure has been more commonly undertaken in treated areas than in control areas as expected; yet, 40% of the surveyed households in the treated villages still consider that the canals supplying water to their kitchen gardens have not been rehabilitated in the last five years and 34% consider the same thing in the case of their presidential plots.
- About 77% of the households contributed their own labor to maintenance of canals serving their kitchen gardens in 2015, and 12% contributed cash for this purpose.

From these descriptive statistics, it is apparent that a number of important differences exist between treated and control villages in terms of their homestead production systems and in terms of water management. One might presume that the USAID-WUAs interventions targeted at *dehkan* farms have indirect effects on these households through water access provided to their kitchen gardens and presidential plots and through changes in water management and governance. Further analysis with econometric tools and a robust identification strategy will be required to establish potential causality for effects such as these.

Similarly, possible linkages between improved access to water, the homestead production system and food security will need to be understood using the data from this household survey and from a follow-up household survey to be conducted in 2018. It will be instructive to characterize the extent to which an intervention focussing on improving water access and water governance for farms has spill over effects on food security.

## CHAPTER 4 - PRIMARY RESPONSIBILITY FOR AGRICULTURAL TASKS AND DECISION MAKING

### 4.1. Introduction

Economic turmoil brought about by independence and the civil war in the 1990s led to a reduction in off-farm employment opportunities and to a renewed dependence on agriculture for both food and income among rural families in Southern Tajikistan. These conditions also spurred changes in the demographics of many farming communities, first as a result of wartime displacement, then due to high rates of male labor migration. Of the households surveyed in 2016, 47% (904) had at least one family member who migrated for labor in 2015 and 14% (263) were headed by women. This chapter provides an understanding of the gendered division of key agricultural responsibilities and decisions within this changing social landscape.

Specifically, using data collected in the 2016 household survey this chapter will compare who takes primary responsibility for agricultural tasks and decisions on kitchen, presidential, and *dehkan* farm plots overall and within three different contexts: 1) male versus female-headed households,<sup>5</sup> 2) migrant households versus non-migrant households,<sup>6</sup> and 3) households within control versus treated *jamoats*. For each task and decision, respondents were asked to select one of the following individuals: male members of the household (MOH), female MOH, children from the household who were under the age of 16,<sup>7</sup> male hired laborers, female hired laborers, other farm members who do not have any relation to the respondent household, or other.

While gender and power dynamics vary among households, identifying broad patterns as to which household member is the primary actor in different areas of agricultural production is important to the design of effective training and outreach programs. This information will also foster a better understanding of who may be impacted by interventions. It should, however, be stressed that if an individual is not listed as the primary actor for a particular task, it does not mean that he or she is not involved or influential in some capacity.

This analysis was only performed for households that cultivated the plots in question in 2015 and who conducted the agricultural tasks which are outlined in this chapter.

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<sup>5</sup> Gender of the head of household was self-stated by respondents and limited clarification was required by enumerators, as “household head” is a well understood concept in Tajikistan.

<sup>6</sup> Households that have had at least one family member spend time as a migrant in 2015 are considered “migrant households.”

<sup>7</sup> It was anticipated that children under the age of 16 would rarely be selected as the individual primarily responsible for tasks or decisions. As such, no distinction was made between boys and girls.

## 4.2. Division of agricultural labor

### 4.2.1. Primary actors for agricultural tasks

Overall, male MOH were found to be the primary actors for the largest share of activities on kitchen, presidential, and *dehkan* farm plots. However, the rate at which male MOH and female MOH were named as primary actors on the different plots did vary.

Traditionally, women in Tajikistan are thought to be more involved in the cultivation of household plots than *dehkan* farm plots. The data collected supports this perception. On average, female MOH were identified as being the primary actors for completing agricultural tasks on kitchen gardens and presidential plots by 40% and 19% of all households, respectively (see Table 23). In comparison, female MOH were identified as the primary actor on *dehkan* farm plots by just 13% of households on average. The difference in female MOH's primary actor status in household and *dehkan* farm plots may in part result from an historical norm, as during the Soviet era most managerial positions on farms were held by men. While there has been an increase in the number of female *dehkan* farm managers, the designation of manager does not necessarily imply that these women take on primary responsibility for the majority of agricultural tasks.

The difference in the percentage of female MOH who were named as the primary actor on kitchen and presidential plots may stem from the fact that presidential plots are often located farther from the household.

**Table 23 - Primary actor for agricultural labor (average %)**

Plot type	Male MOH	Female MOH	Children From HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Total
Kitchen [n=1897] <sup>8</sup>	55.43	39.52	1.10	3.41	0.03	0.50	100
Presidential [n=651]	68.93	19.92	0.67	9.06	0.23	1.50	100
<i>Dehkan</i> [n=276]	68.47	12.95	0.43	13.84	1.20	3.11	100

Source: Survey data collected by authors in 2016.

Female hired laborers were rarely listed as the primary actor by households for tasks, most commonly harvesting and processing of crops (6% of households) or weeding on the *dehkan* farm plot (5%). In comparison, male wage laborers were named by a higher number of households as the primary actor on kitchen, presidential, and *dehkan* plots.

A slightly different picture emerges when we compare male-headed and female-headed households. Out of all individuals, female MOH have the greatest share of primary responsibility for tasks on the kitchen

<sup>8</sup> The sample size (n) represents the maximum number of households that could be included in calculations. In calculating the proportion of households which named one of the above individuals as the primary actor for any plot task, households that did not complete the tasks in question were excluded and so the sample size for each task varied.

plots in female-headed households, whereas in male-headed households, male MOH have the greatest share. On presidential and *dehkan* plots, male MOH are the primary actors regardless of the gender of the household head, though it is interesting to note that in both types of plots female MOH take on a greater proportion of responsibilities in female-headed households than in male-headed households. See Table 24 in Annex 2.

There are no major differences in the overarching pattern of who is the primary actor for overall plot activities on kitchen and presidential plots when the data are delineated based on non-migrant versus migrant households. However, on kitchen gardens and *dehkan* farms, a slightly higher proportion of female MOH from migrant households take responsibility for tasks as compared to those living in non-migrant households. See Table 25 in Annex 2.

When households in treated and control *jamoats* are examined, there are no major differences in the pattern of who is the primary actor for overall plot activities on kitchen, presidential or *dehkan* plots. See Table 26 in Annex 2.

The remainder of this section looks in greater depth at the division of agricultural labor on kitchen, presidential, and *dehkan* farm plots by identifying who is primarily responsible for specific tasks in the following categories: land preparation and planting, tending crops, and harvesting and processing. The breakdown of tasks within these categories is listed below:

#### Land Preparation and Planting

- Purchasing inputs
- Breaking up soil and making furrows
- Planting seeds/saplings
- Ploughing
- Maintaining agro-machinery

#### Tending Crops

- Weeding
- Pruning fruit trees
- Applying irrigation water
- Cleaning irrigation canals
- Speaking with neighbor in the event of an irrigation water conflict
- Speaking with irrigation service provider in event that water is not received
- Applying fertilizer
- Applying pesticides
- Feeding livestock

#### Harvesting and Processing

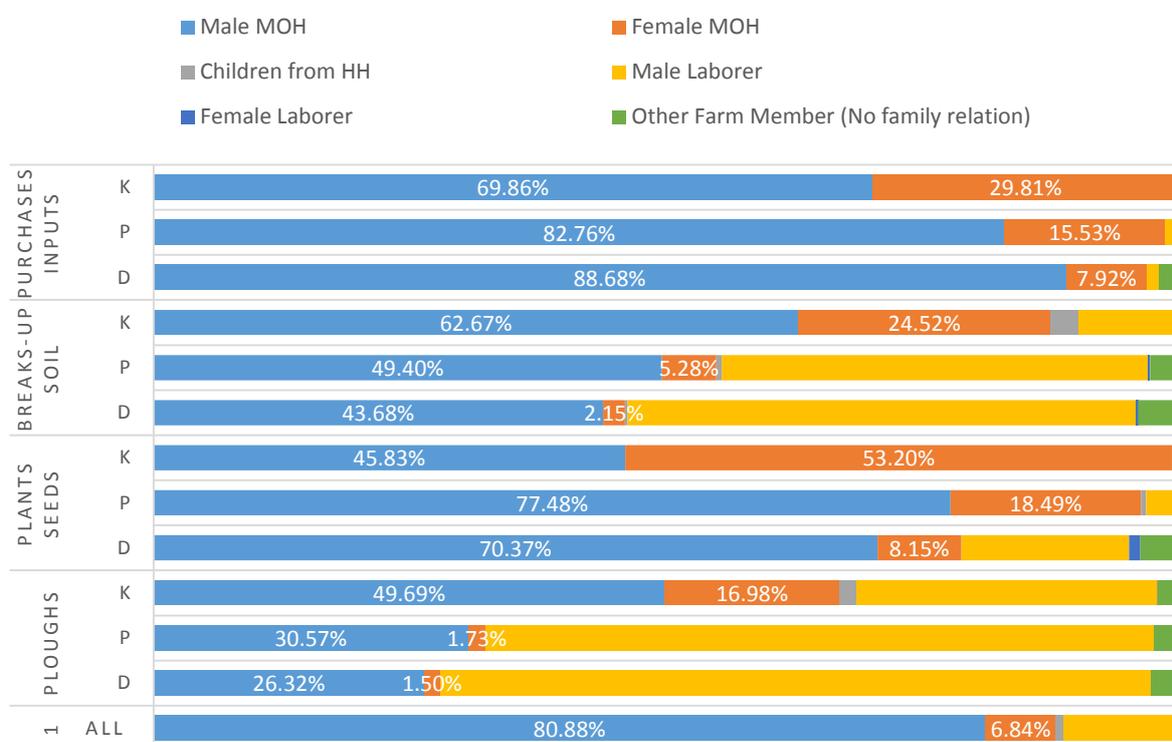
- Hiring laborers
- Harvesting crops
- Negotiating sale of crops
- Storing seeds

## 4.2.2. Primary actors for land preparation

### 4.2.2.1. Overview

On kitchen plots, we find that male MOH are primarily responsible for all agricultural tasks related to land preparation, with the exception of sowing crops (See Figure 14 and Table 27 in Annex 2). In this case, 53% of respondents said female MOH were primarily responsible for planting seeds and saplings. Female MOH also formed the second highest proportion of primary actors for the purchasing of inputs and breaking up the soil. After male MOH, hired male laborers were most commonly listed as the primary actor for ploughing. In rural Tajikistan, few households own the machinery needed for ploughing and are therefore required to hire the equipment and an individual with the skills necessary to operate it. Men overwhelmingly occupy this position.

**Figure 14 - Division of primary actor status for land preparation activities on kitchen gardens (K), presidential plots (P) and *dehkan* farms (D)**



Note: 1= Maintains agro-machinery  
Source: Survey data collected by authors in 2016.

On presidential plots, the dependence on male wage laborers to plough the land is even higher, with 65% of respondents naming them as the individual primarily responsible for completing this activity. Male wage laborers also play a significant role in breaking up the soil and dividing the land into furrows on presidential plots. With the exception of ploughing, male MOH are primarily responsible for all tasks related to land preparation on the presidential plots, including planting seeds and saplings.

The overall division of labor on the *dehkan* farm plots was similar to the presidential plots, with the exception that in addition to ploughing, male wage laborers take primary responsibility for breaking up the soil and making furrows. Interestingly, while female MOH had the second highest share of responsibility for the planting of seeds and saplings on the presidential plots, on the *dehkan* plots this position was taken by male wage laborers. This shift may result from the use of tractors to sow seeds on *dehkan* farms plots which, as discussed earlier, are primarily operated by men. Kitchen gardens and presidential plots on the other hand, may be a more manageable size for household members to sow without machinery.

If agro-machinery was owned, male MOH were overwhelmingly listed as primarily responsible for the maintenance of equipment (81%), followed by male wage laborers (11%). Female MOH were the primary actors for this task in just 7% of cases.

#### 4.2.2.2. *Difference between male-headed and female-headed households*

The division of responsibility for land preparation on kitchen and presidential plots is similar between female and male-headed households; however, in female-headed households, a higher proportion of female MOH are listed as the primary actor (Table 28, Annex 2). Additionally, there is a distinct divergence between male and female-headed households with regard to who purchases inputs for the kitchen plots. In female-headed households, female MOH are primarily responsible for this task (54%). In comparison, in male-headed households, a male MOH most commonly purchases inputs (74%). This difference is statistically significant at the 1% level ( $p=0.001$ ).

There is no difference between male- and female-headed households as to who is responsible for land preparation tasks on the *dehkan* farm plots.

Among male-headed households that owned agro-machinery, female MOH were responsible for the maintenance of this equipment in just 5% of cases. However, among female-headed households, a much higher percentage of respondents (19%) said that female MOH completed this task. This difference is statistically significant at the 1% level ( $p=0.001$ ). This may indicate in the absence of a male head of household, who may be more experienced in machinery maintenance or have connections to local mechanics, women in female-headed households have had to take on more responsibility for the task, even though it is not traditionally completed by women.

#### 4.2.2.3. *Difference between migrant households and non-migrant households*

When migrant households and non-migrant households are compared, no difference is found in the individual listed as primarily responsible for any of the tasks related to land preparation on kitchen, presidential, or *dehkan* farm plots (Table 29, Annex 2). Although interestingly, in comparison to non-migrant households, for all land preparation tasks on kitchen plots, female MOH from migrant households form a greater proportion of the total individuals listed as the primary actor. This characteristic is not found with regard to the presidential plots. However, on *dehkan* farm plots, a higher proportion of female MOH from migrant households are responsible for the purchase of inputs and the planting of seeds and saplings (11% and 15%) than female MOH from non-migrant households (3% and 6%). The difference between these households in regards to who purchases the inputs is significant at the 1% level ( $p=0.002$ ).

For migrant households, a slightly higher proportion of female MOH were listed as the primary actor in the maintenance of agro-machinery, as compared to in non-migrant households; however, male household members still primarily execute this task in both groups. Nevertheless, this difference is significant at the 1% level ( $p=0.011$ ).

#### 4.2.2.4. *Difference between households in treated and control jamoats*

There is no difference between households in control and treatment *jamoats* when the gender of individual primarily responsible for land preparation activities on kitchen gardens, presidential plots or *dehkan* farm plots is compared (Table 30, Annex 2). However, there is a statistically significant difference (at the 5% level) in the proportion of female MOH who primarily plant seeds and saplings on the *dehkan* plots between households in treatment and control *jamoats* ( $p=0.024$ ). Among households in treatment *jamoats*, the proportion of female MOH who sow seeds was higher than the proportion of female MOH who complete this task in control *jamoats*.

### 4.2.3. Primary actors for tending crops

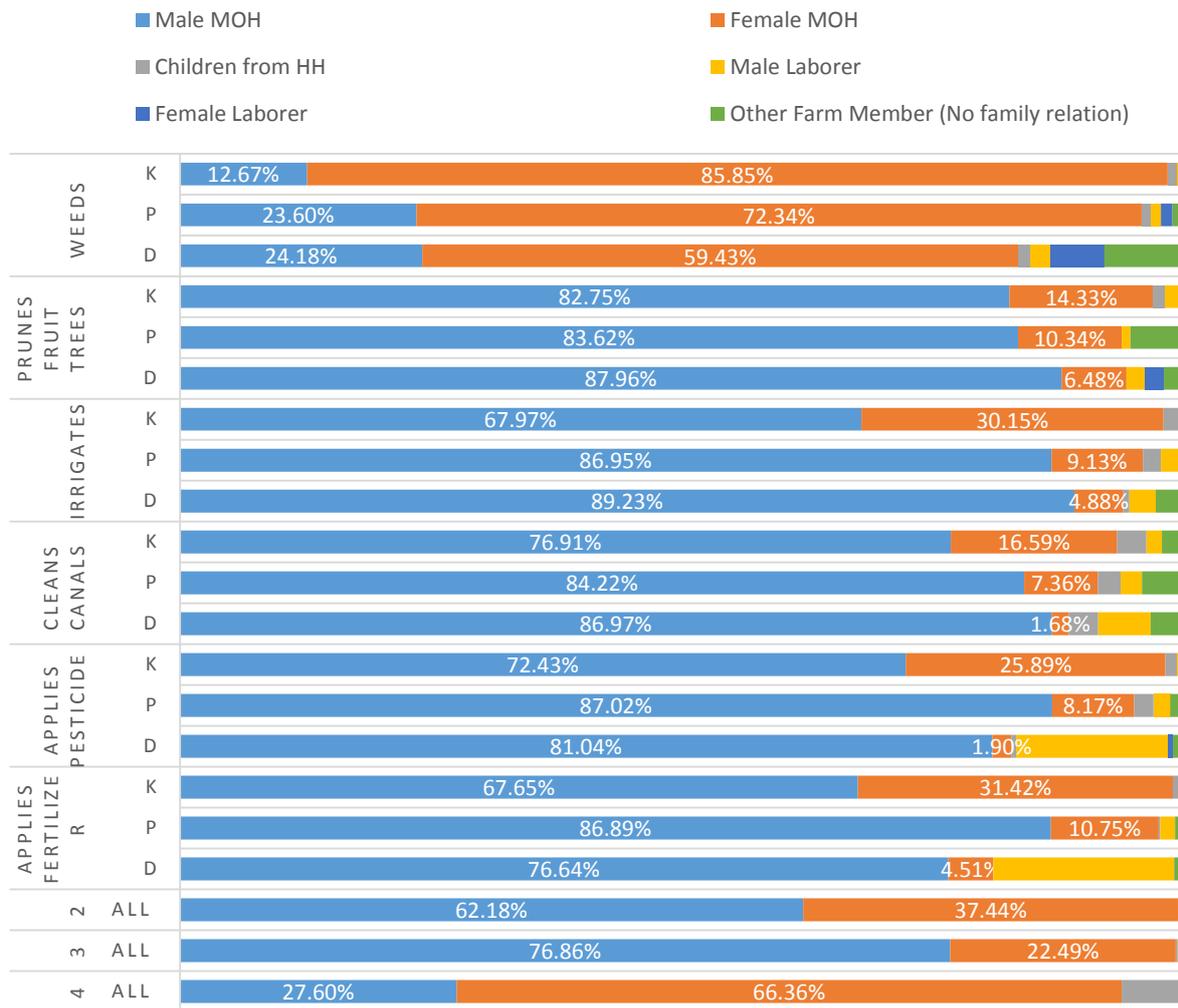
#### 4.2.3.1. *Overview*

On kitchen gardens and presidential plots, male MOH were listed as primarily responsible for pruning fruit trees, irrigating crops, clearing canals, as well as applying pesticides and fertilizer, while female MOH were only listed as being the prime actor for weeding (see Figure 15). This is consistent with patterns of labor division which have been observed historically in Tajikistan, whereby men were responsible for tasks involving physical strength or technical knowledge while women completed tasks that required less skill, but did need meticulous attention and were often tedious. Female MOH make up the second highest proportion of primary actors for all activities in this category on these plots. The gendered division of labor for the tending of crops on *dehkan* plots mirrors the pattern present on the kitchen garden and presidential plot, with the exception that the second highest proportion of households named male wage laborers, as opposed to female MOH, as primarily responsible for applying pesticides and fertilizer and cleaning irrigation canals on the *dehkan* farm plot. During qualitative data collection in 2015, women indicated that on large farm plots fertilizer and pesticide may be applied by hired equipment and the application of these chemicals, as well as cleaning canals, are activities that they consider to be physically difficult.

Across all three plots, respondents were also questioned as to who would speak with neighbors and the irrigation service provider in the event of a problem receiving water. Male MOH were primarily responsible for these tasks on the majority of households (62% and 77%, respectively). A total of 37% households named female MOH as responsible for talking with neighbors if there were a conflict over water, while just 22% of households said the female MOH would speak with the irrigation service provider if water was not received.

Household livestock was most commonly fed by female MOH, followed by male MOH, and children from the household.

**Figure 15 - Division of primary actor status for crop tending activities on kitchen gardens (K), presidential plots (P) and *dehkan* farms (D)**



Note: 2= Speaks with neighbor in event of water conflict, 3= Speaks with irrigation service provider if water not received, 4= Feeding livestock

Source: Survey data collected by authors in 2016.

#### 4.2.3.2. Difference between male-headed and female-headed households

There were no differences between female and male-headed households as to the individual primarily responsible for tending crops on kitchen, presidential, or *dehkan* farm plots. Although, in comparison to male-headed households, female-headed households more frequently stated that female MOH are responsible for pruning fruit trees, applying irrigation water, cleaning irrigation canals, applying pesticide, and applying fertilizer on all three plots.

In the event that there is a conflict over irrigation water on any plot, male MOH take primary responsibility for speaking with neighbors and irrigation service providers in male-headed households. However, in female-headed households, female MOH most often take on these responsibilities. There is a statistically significant difference at the 1% level between male- and female-headed households as to who speaks with neighbors ( $p < 0.001$ ) and with irrigation service providers ( $p < 0.001$ ). This may

indicate that negotiations regarding access to irrigation water are managed by the household head, rather than the individual responsible for the physical act of irrigation or defined along gender lines.

#### 4.2.3.3. *Difference between migrant households and non-migrant households*

The individual primarily responsible for tasks related to the tending of crops on kitchen, presidential, and *dehkan* farm plots is the same in migrant and non-migrant households. Slightly more female MOH were named by respondents from migrant households as the primary actor in regards to weeding, pruning fruit trees (statistically significant at the 5% level,  $p=0.03$ ), applying irrigation water, cleaning irrigation canals, and applying pesticides and fertilizer on kitchen gardens. This pattern did not apply on presidential plots; however, there is a slightly higher proportion of migrant households who stated that female MOH were responsible for these tasks on *dehkan* farms, as compared to non-migrant households.

There was no difference between non-migrant and migrant households as to the individual identified as primarily responsible for speaking with neighbors or irrigation service providers if a challenge with irrigation water occurs. But, among migrant households, a higher proportion of female MOH were named to be primarily responsible for these tasks. For both speaking with neighbors ( $p=0.022$ ) and irrigation service providers ( $p<0.001$ ) this difference is significant at the 1% level.

#### 4.2.3.4. *Difference between households in treated and control jamoats*

The individual identified as the primary actor on kitchen, presidential, and *dehkan* farm plots was from the same category for households in treatment and control *jamoats* for all tasks relating to the tending of crops as well as the feeding of livestock.

### 4.2.4. Primary actors for processing and marketing

#### 4.2.4.1. *Overview*

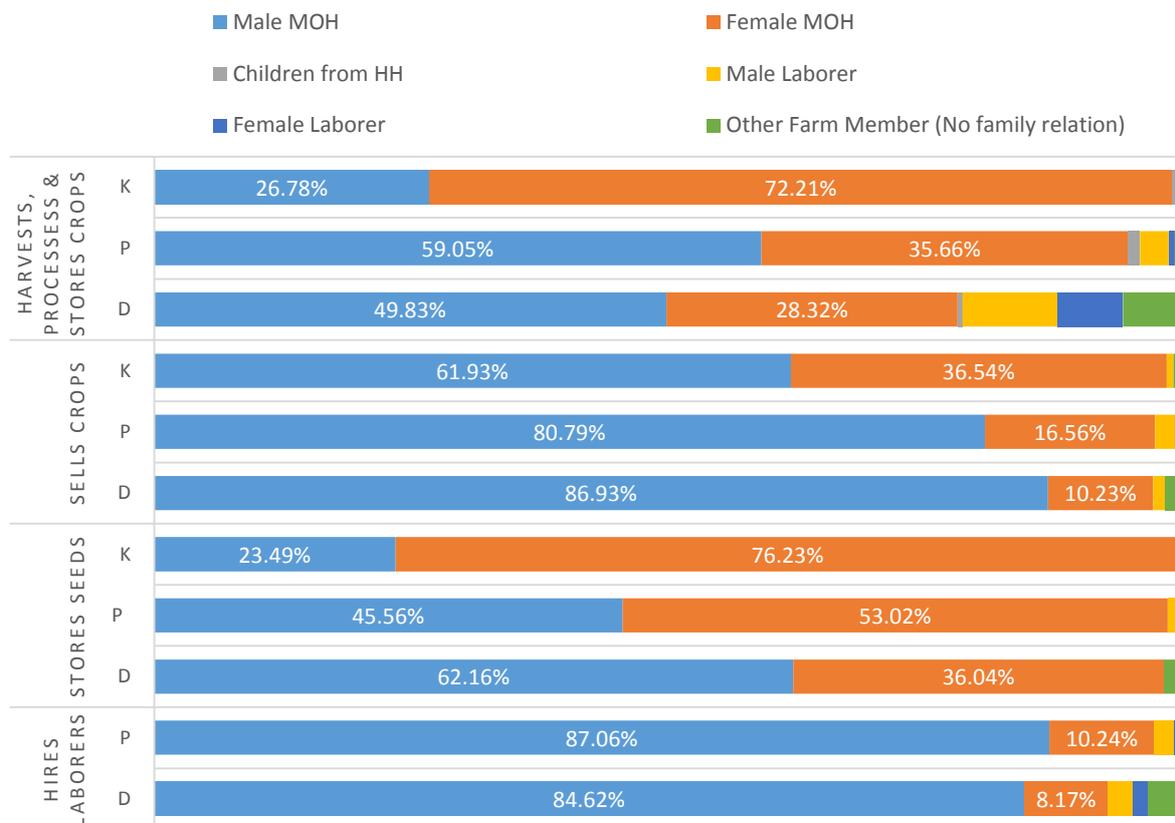
The majority of households said that female MOH are primarily responsible for the harvesting, processing, and storage of crops as well as the storage of seeds from the kitchen garden (see Figure 3). Despite their involvement in these tasks, only 37% of respondents said that female MOH executed the sale of kitchen garden crops.

Comparatively, on the presidential plots, the majority of respondents said male MOH primarily harvested, processed and stored crops, as well as negotiated crop sales and hired laborers.<sup>9</sup> While female MOH still most commonly stored seeds on the presidential plots, on the *dehkan* plots, male MOH were primary responsible for all processing and marketing tasks.

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<sup>9</sup> Respondents were not asked who hires and manages laborers on the kitchen plot.

**Figure 16 - Division of primary actor status for processing and marketing activities on kitchen gardens (K), presidential plots (P) and *dehkan* farms (D)**



Source: Survey data collected by authors in 2016.

#### 4.2.4.2. Difference between male-headed and female-headed households

As was seen with land preparation and the tending of crops, the proportion of respondents who stated that female MOH are responsible for the processing and marketing of crops was higher for female-headed households. Despite this, there were no overall differences in the primary actor for the harvesting, processing and storage of crops, storage of seeds, or hiring and managing of laborers among households on any plot. Interestingly, there is a difference between female- and male-headed households with regard to who negotiates the sale of crops on kitchen gardens. In male headed households, male MOH are primarily responsible for negotiating the sale of crops from the kitchen garden (64%), whereas in female-headed households, the greatest share of respondents said that female MOH are the primary actor for this task (50%).

On *dehkan* farms managed by female-headed households, female MOH are primarily responsible for harvesting and processing crops, as well as for the storage of seeds; however, male MOH are still responsible for the sale of crops and hiring of laborers. In-male headed households, male MOH are responsible for all processing and marketing activities. The difference between the individual primarily responsible for crop harvesting and processing in male- and female-headed households is significant at the 1% level ( $p=0.005$ ).

#### 4.2.4.3. Difference between migrant households and non-migrant households

In comparing migrant and non-migrant households, there was no difference in the individual who is primarily responsible for the processing and marketing of crops from kitchen, presidential and *dehkan* plots. However, for all tasks on these plots, female MOH from migrant households are the primary actors for a higher proportion of the activities. In particular, there is a significant difference at the 5% level in the identification of primary actors between these households in negotiating crop sales ( $p=0.014$ ) and the storage of seeds ( $p=0.024$ ) from the kitchen plots. A similar difference applies to who hires and manages laborers ( $p=0.036$ ) for the *dehkan* farm.

#### 4.2.4.4. Difference between households in treated and control *jamoats*

The main actor for tasks relating to the processing and marketing of crops is the same for households in treatment and control *jamoats* on kitchen, presidential, and *dehkan* farm plots.

### 4.3. Division of agricultural decision making

#### 4.3.1. Decision making for agricultural tasks

Constraints, such as time or physical ability, as well as personal preferences may mean that the individual who decides when and how an agricultural task should be completed, is not the same individual who carries out the activity. As such, respondents were also asked to identify the primary decision maker for key agricultural tasks on different types of plots.

As observed in the analysis of the division of labor, overall, the majority of households said that male MOH were the primary decision makers in regards to the kitchen, presidential, and *dehkan* farm plots. As may be expected, individuals other than adult household members rarely make decisions for plot activities (Table 24).

**Table 24 - Primary actor for decision making on agricultural plots (average %)**

Plot type	Male MOH	Female MOH	Children From HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Someone Else	Total
<b>Kitchen</b> [n=1897] <sup>10</sup>	57.55	42.36	0.02	0.02	0.00	0.06	0.00	100
<b>Presidential</b> [n=651]	74.11	24.96	0.02	0.60	0.03	0.26	0.03	100
<b>Dehkan</b> [n=276]	84.27	14.70	0.00	0.00	0.32	0.71	0.00	100

Source: Survey data collected by authors in 2016.

When responses are divided based on the gender of the household head, we see that the majority of respondents from female-headed households stated that female MOH are the primary decision

<sup>10</sup> The sample size (n) represents the maximum number of households that could be included in calculations. In calculating the proportion of households which named one of the above individuals as the primary actor for any plot task, households that did not complete the tasks in question were excluded and so the sample size for each task varied.

makers for kitchen (73% of households) and presidential plots (55% of households). In male-headed households, the opposite is true. Male MOH were the primary actors for decision making on the *dehkan* farm for both household types. See Table 32 in Annex 3. This data reinforces the understanding that the individual primarily responsible for making decisions can be different from the individual primarily responsible for completing agricultural tasks on the plot, as overall, male MOH were the primary actor regarding labor on the presidential plot in female headed households.

There was no difference between migrant and non-migrant households as to the primary decision maker for the kitchen, presidential or *dehkan* farm plots. However, a slightly higher proportion of migrant households named a female MOH as the decision maker for the kitchen and *dehkan* farm plots. See Table 33 in Annex 3.

The individual identified as the primary decision maker for kitchen, presidential, and *dehkan* farm plots was the same for households in treatment and control *jamoats*. See Table 34 in Annex 3.

The rest of this section will examine who the primary decision maker is for specific tasks on each plot. The decision making tasks included this analysis are as follows:

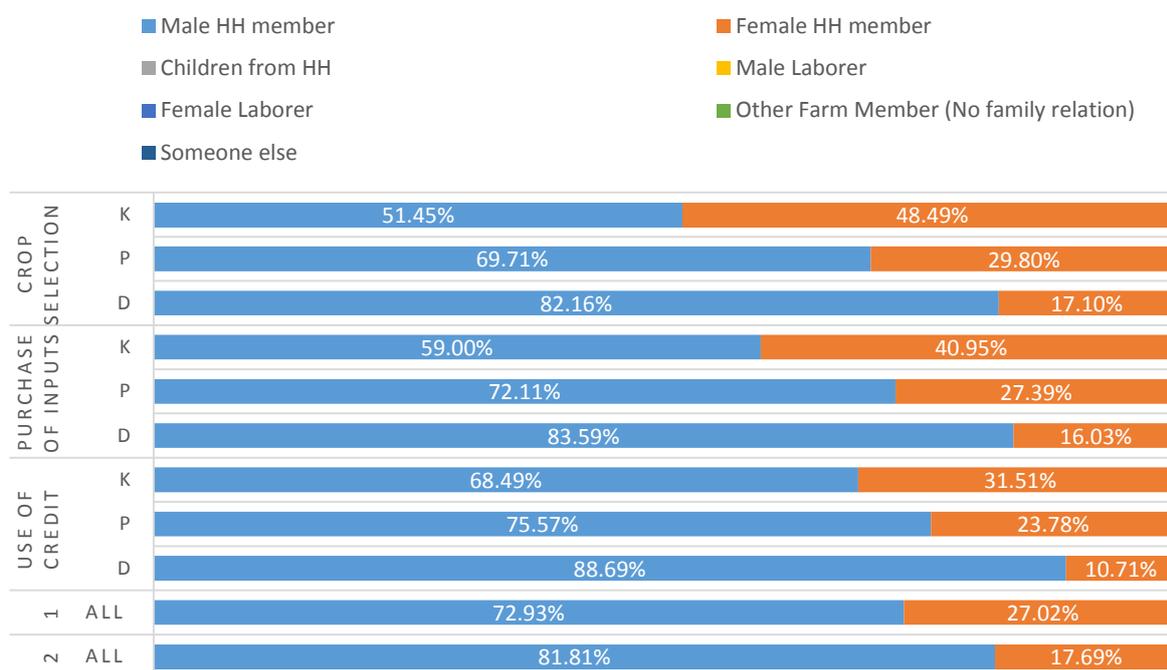
Land Preparation and Planting	Tending Crops	Harvesting and Processing
<ul style="list-style-type: none"> <li>• Selection of crop types</li> <li>• Selection of inputs (seed/sapling, fertilizer, and pesticide) varieties and amounts</li> <li>• Choice to use or not use credit in the purchase of inputs</li> </ul>	<ul style="list-style-type: none"> <li>• Choice as to when to apply irrigation water</li> <li>• Choice as to how much irrigation water to apply</li> </ul>	<ul style="list-style-type: none"> <li>• Choice as to when to hire wage laborers for presidential or <i>dehkan</i> plots</li> <li>• Selection of wage laborers for presidential or <i>dehkan</i> plots</li> <li>• Choice as to how much to pay wage laborers for presidential or <i>dehkan</i> plots</li> <li>• Choice as to how much agricultural produce to sell, store or consume</li> <li>• Choice as to how to spend income from crop sales</li> </ul>

#### 4.3.2. Decision making for land preparation

##### 4.3.2.1. Overview

Decisions related to land preparation on kitchen, presidential, and *dehkan* plots are primarily made by male MOH for the majority of households (See Figure 17). Although with regard to crop selection for the kitchen garden, the difference between the proportions of households which named male MOH and female MOH as the primary decision maker is minimal at 51% and 48% of households respectively. Discussions with women in rural areas as a part of the qualitative data collection in 2015, showed that beyond personal or household preference, women took into account the amount of water they thought their plots would receive and selected crops that were likely to thrive under these conditions.

**Figure 17 - Division of primary decision maker status for land preparation activities on kitchen gardens (K), presidential plots (P) and *dehkan* farms (D)**



Note: 1= Purchase of tools, 2= Purchase of equipment  
Source: Survey data collected by authors in 2016.

See Table 35, Annex 3 for complete data related to the division of decision making across plots.

#### 4.3.2.2. Difference between male-headed and female-headed households

There is a distinct variation between male and female headed-households as to who makes final decisions regarding land preparation. In female-headed households, female MOH select the crops and inputs as well as decide whether to use credit for both the kitchen and presidential plots. The inverse is true in male-headed households. These differences that are seen on the kitchen and presidential plots are all significant at the 1% level ( $p < 0.001$ ). While the majority of female-headed households (59%) said that male MOH select the types of crops to grow on *dehkan* farm plots, the proportion of female MOH who make this decision is higher in female-headed households (33%) than in male headed households (15%). This difference is significant at the 1% level ( $p = 0.01$ ). The proportion of male and female MOH who make decisions on the purchase of inputs and use of credit for the dehkan plot are divided evenly in female-headed households, but in male-headed households just 12% of respondents said that female MOH decided which inputs to purchase and 8% said that female MOH decided whether or not use credit. The difference between primary decision maker status was significant at the 1% level for the purchase of inputs ( $p < 0.001$ ) and at the 5% level for the use of credit ( $p = 0.017$ ).

In female-headed households, female MOH decide when and at what price to purchase small agricultural tools, but in male-headed households, male MOH make this decision (statistically significant at the 1% level,  $p < 0.001$ ). With regard to the purchase of large agricultural equipment, male

MOH are the primary decision makers in male-headed households (87%), but the proportion of decision makers is approximately even between male and female MOH in female-headed households at 50% and 49% respectively. This difference is statistically significant at the 1% level ( $p < 0.001$ ). This reinforces the idea that while working with large agricultural equipment is an area of work dominated by men, in female-headed households, women take on more responsibility.

See Table 36, Annex 3 for complete data related to the division of decision making on female and male headed households.

#### 4.3.2.3. *Difference between migrant households and non-migrant households*

In both migrant and non-migrant households, male MOH make all final decisions regarding land preparation, with one exception. On the kitchen plots, female MOH from migrant households were listed as the primary decision maker for crop selection, a difference which was significant at the 1% level ( $p = 0.002$ ). Female MOH from migrant households also tend to have a slightly higher proportion of decision making responsibility for other tasks. The differences between the proportions of male and female MOH who were primary decision makers on the kitchen plots is significant at the 1% level in regard to the amount and variety of seeds or saplings to purchase ( $p = 0.001$ ), and at the 5% level regarding whether to purchase inputs on credit ( $p = 0.048$ ). Statistically significant differences at the 5% level between these household types are also seen for who decides to purchase small agricultural tools ( $p < 0.001$ ) and large agricultural equipment ( $p = 0.036$ ).

See Table 37, Annex 3 for complete data related to the division of decision making on migrant and non-migrant households.

#### 4.3.2.4. *Difference between households in treated and control jamoats*

The primary decision makers for households in treated and control *jamoats* are the same, except in regard to who selects the crops that are grown on the kitchen plots. In this instance, male MOH are responsible for the task in households located in control *jamoats* and female MOH are the primary decision makers in households in treated *jamoats* by a slight majority. This difference is significant at the 5% level ( $p = 0.017$ ).

See Table 38, Annex 3 for complete data related to the division of decision making in households in treatment and control *jamoats*.

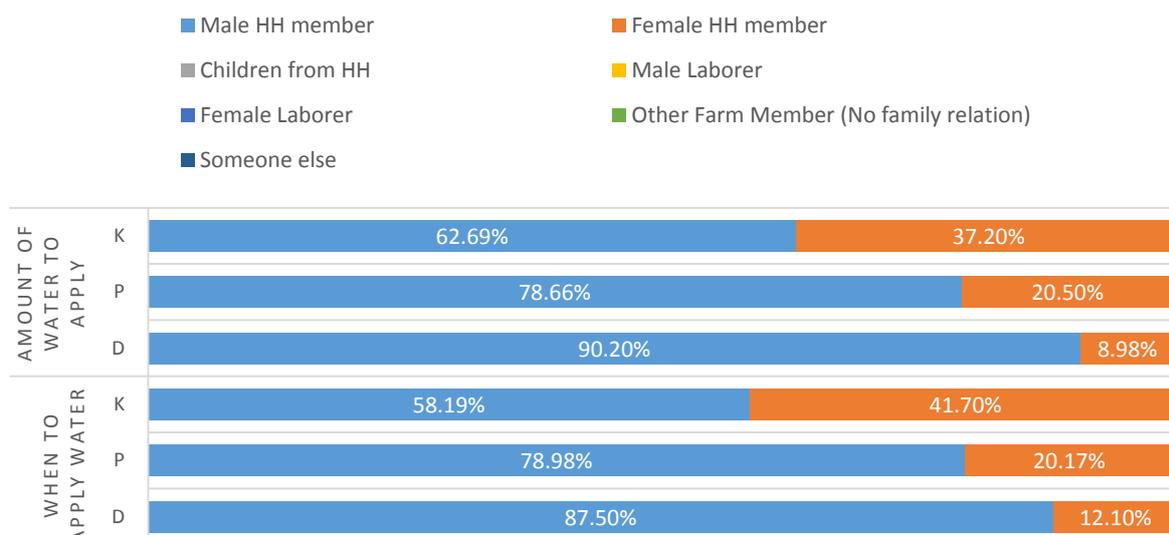
### 4.3.3. Decision making for tending crops

#### 4.3.3.1. *Overview*

Male MOH were identified by the majority of households as the primary decision maker regarding when and how much water to apply to crops on the kitchen, presidential, and *dehkan* farm plots (See Figure 18). Analysis of the qualitative data collected in 2015 showed that, as women have not historically been as involved as men in the irrigation of farm plots, women in rural areas often felt they

did not have enough knowledge regarding the task. This may account for why fewer women are the primary decision maker for these tasks across plots.

**Figure 18 - Division of primary decision maker status for crop tending activities on kitchen gardens (K), presidential plots (P) and dehkan farms (D)**



Source: Survey data collected by authors in 2016.

#### 4.3.3.2. Difference between male-headed and female-headed households

On the kitchen plots, female MOH from female-headed households are primarily responsible for deciding when and how much irrigation water should be applied to crops (69% of households), while in male-headed households male MOH take on this task (68%). This difference is significant at the 1% level ( $p < 0.001$ ).

On the presidential plots, an almost equal proportion of households said that female MOH and male MOH are primarily responsible for deciding when to water the plots (51% and 49% respectively), but slightly more female-headed households noted that female MOH (53%), rather than male MOH (47%), decide what amount of water to give to crops. In male-headed households, male MOH were overwhelmingly the primary decision makers for both activities, with 84% of households saying these male MOH decide both when and how much water to give crops. The differences between male and female MOH decision-making status for irrigation on the presidential plots in these two types of households are significant at the 1% level ( $p < 0.001$ ).

Male MOH were responsible for making decisions regarding both irrigation activities on the *dehkan* plots for the two household types; however, a larger proportion of female MOH from female-headed households were named as primary decision maker.

#### 4.3.3.3. *Difference between migrant households and non-migrant households*

In comparing migrant and non-migrant households, we find that there is no overall difference in the individual primarily responsible for deciding how irrigation activities should be conducted on any of the three types of plots. However, on the kitchen plots, a higher share of migrant households said that female MOH are responsible for deciding when water should be applied and how much to apply. The differences in the proportions for both when to irrigate crops ( $p=0.001$ ) and how much water to apply ( $p<0.001$ ) are significant at the 1% level.

#### 4.3.3.4. *Difference between households in treated and control jamoats*

Similarly, across the treatment and control groups, there is no significant difference as to who decides when and how much irrigation water should be applied to the kitchen, presidential or *dehkan* farm plots.

### 4.3.4. Decision making for harvesting and processing

#### 4.3.4.1. *Overview*

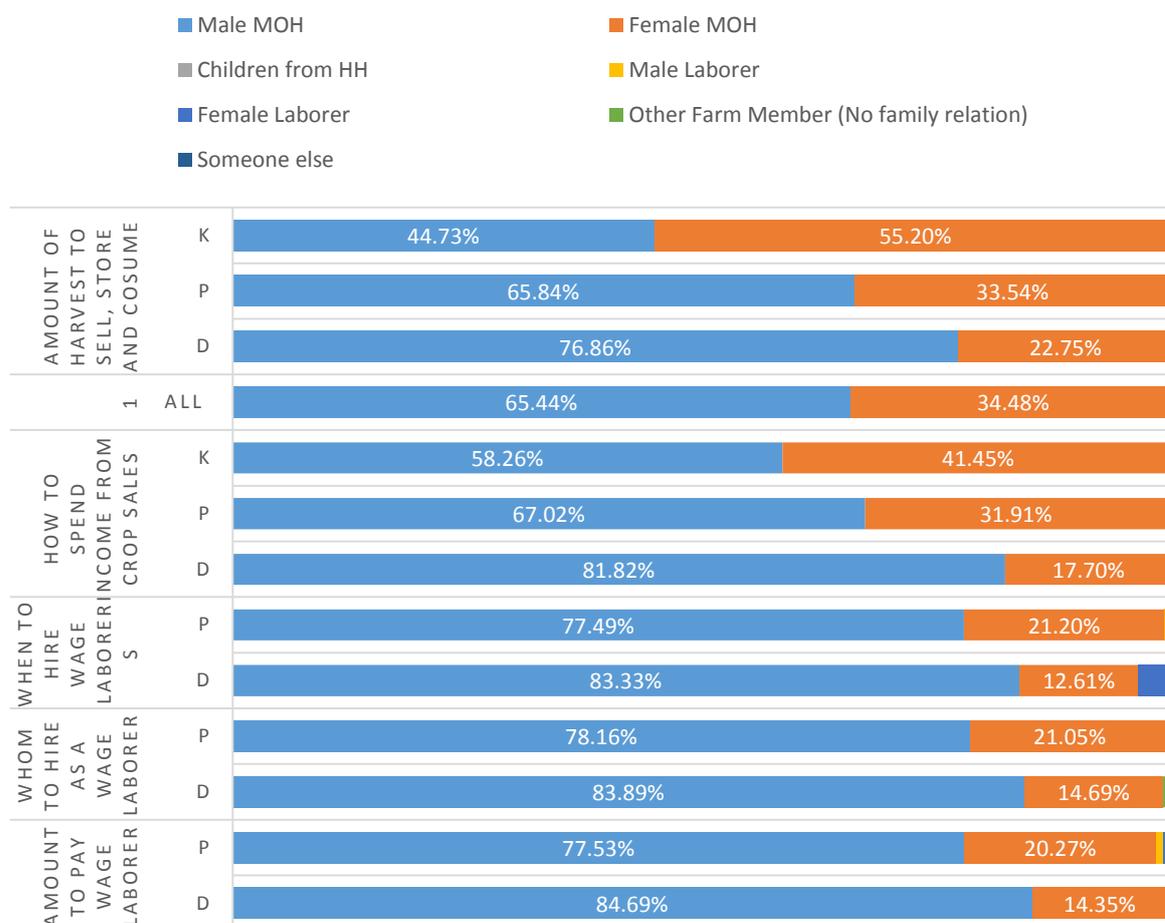
The majority of households said that male MOH usually decide when and whom to hire as wage laborers as well as the amount they should be paid. Most households also said that male MOH decide how much of the harvest from presidential and *dehkan* plots should be sold. However, regarding produce from the kitchen plots, a majority said that female MOH primarily make this decision. Male MOH were most commonly listed as the primary decision maker regarding the sale of livestock and poultry as well as for how the income from agricultural sales on all three plots should be spent.

#### 4.3.4.2. *Difference between male-headed and female-headed farms*

In female-headed households, female MOH are primarily responsible for deciding how much of the harvest from kitchen and presidential plots should be taken to market and how the income from these sales should be spent. However, male MOH most commonly make all these decisions in regard to the *dehkan* farm plots. In male-headed households, male MOH are responsible for all these decisions, with the exception that, on the kitchen plots, the proportion of male-headed households that listed female MOH and male MOH as the primary decision maker regarding the amount of agricultural produce to sell or retain is approximately equal (52% and 48%, respectively). The differences between female- and male-headed households as to who negotiates the sale of crops and decides how the proceeds will be spent are significant for both the kitchen gardens and presidential plot at the 1% level ( $p<0.001$ ) and at the 5% levels on the *dehkan* farm plots ( $p=0.012$  for crop sale and  $p=0.018$  for spending of proceeds).

Female MOH decide the amount of livestock and poultry products to sell and retain in female-headed households, while male MOH make this decision in male-headed households. This difference is significant at the 1% level ( $p<0.001$ ).

**Figure 19 - Division of primary decision maker status for harvesting and processing activities on kitchen gardens (K), presidential plots (P) and *dehkan* farms (D)**



Note: 1= Amount of livestock and poultry products to sell, store and consume  
 Source: Survey data collected by authors in 2016.

When deciding when and whom to hire as laborers on the presidential plots, households headed by men most often said that male MOH are the primary decision makers. In female-headed households, an equal proportion of female and male MOH were identified as the primary decision maker regarding when to hire wage laborers for the presidential plots. On the *dehkan* farm plots, male MOH decide when and whom to hire as wage laborers, for both male- and female-headed households; however, a higher proportion of female MOH make these decisions in female-headed households. The differences in primary actors in male- and female-headed households are statistically significant at the 5% level for when to recruit wage laborers ( $p=0.024$ ) and for whom to hire ( $p=0.030$ ).

On presidential and *dehkan* plots, the data indicates that the amount to pay wage laborers is decided by male MOH in both household types.

#### 4.3.4.3. Difference between migrant households and non-migrant households

Male MOH are responsible for all processing and marketing decisions in migrant and non-migrant households; however, a slightly higher proportion of female MOH are the primary decision makers for these tasks among migrant households. There was a significant difference between the primary actors in migrant and non-migrant households at the 1% level regarding the amount of produce from the kitchen garden to sell ( $p=0.01$ ) and how to spend the income ( $p=0.005$ ).

A statistically significant difference at the 5% level was also seen for male and female MOH's primary actor status in migrant and non-migrant households for decisions regarding when ( $p=0.003$ ) and whom to hire as wage laborers ( $p=0.024$ ) as well as how much they should be paid ( $p=0.041$ ) on the *dehkan* farms.

#### 4.3.4.4. Difference between households in treated and control *jamoats*

There is no difference in the individual responsible for processing and marketing decisions between households in treated and control *jamoats*. However, slightly more households in treated *jamoats* (46%) stated that female MOH primarily decide how to spend income from the kitchen gardens as compared to control *jamoats* (37%). This difference is significant at the 5% level ( $p=0.021$ ).

### 4.4. Summary

Examination of recent survey responses indicates that adult MOH are primarily responsible for all agricultural tasks and decisions on kitchen, presidential, and *dehkan* farm plots, with the exception that male wage laborers most commonly break-up the land on *dehkan* farms and plough both presidential and *dehkan* plots.

In the majority of households, male MOH primarily make and execute overall agricultural decisions on kitchen, presidential, and *dehkan* farm plots. This would suggest that, while traditional notions of the gendered division of labor hold that household cultivation is dominated by women, men in fact play an active role in ensuring successful harvests on these plots. This is not to say, however, that women are not still important actors. Overall, female MOH are more active in providing labor and decision making with the kitchen and presidential plots than for *dehkan* plots. In female-headed households specifically, female MOH are primarily responsible for overall kitchen garden labor and decision making for the kitchen and presidential plots. The interest and engagement of both women and men in household cultivation highlights the significance of these plots to family wellbeing.

When the division of labor and decision making activities are examined for specific tasks, we find that female MOH are primarily responsible for the sowing and harvesting of crops on the kitchen plots, storing seeds from the kitchen and presidential plots for use next season, and giving feed to livestock. Female MOH are also the primary decision makers as to the amount of kitchen garden produce that should be sold, stored, or consumed by the household. All other tasks and decisions are primarily made by men.

However, the data show us that these overall or average divisions of labor may vary distinctly when the gender of the head of the household or household migration is taken into consideration. In general, in female-headed households, female MOH take on more responsibility for activities and

decisions related to land preparation, the tending of crops, as well as harvesting and processing on kitchen, presidential and *dehkan* plots. Similarly, a higher proportion of respondents from migrant households stated that female MOH take responsibility for decisions and tasks concerning land preparation and the tending of crops on the kitchen garden and *dehkan* plots as well as harvesting and processing for all three plots than respondents from non-migrant households. This indicates that in instances where male presence in the household is not as pronounced, women may take on more agriculture responsibility. This understanding is consistent with other survey findings, which showed that out of all the women who said their workload intensified upon the migration of a family member (63% of total women from migrant households), 55% said that the departure increased their agricultural duties.<sup>11</sup>

The areas of agricultural work where women from female-headed and migrant households take on a greater share of primary responsibility include tasks that are traditionally thought of as “male,” such as the maintenance of agro-machinery, applying irrigation water, and clearing irrigation canals. As women may have less experience in these areas, training activities and agricultural extension services should consider placing special emphasis on reaching women from female-headed and migrant households.

Future research should monitor how primary responsibility for different agricultural tasks and decisions on different plots change over time in response to changing rates of out-migration and return migration or in response to changing on and off-farm opportunities for household members.

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<sup>11</sup> A total of 31% of women who experienced an increased workload also stated that their obligations in regards to housework increased, 13% said their duties related to looking after children or the elderly increased and 2% said their responsibilities towards income generation increased.

## CONCLUSION

Water Users Associations have been created and supported by FFP with the main objective of improving the access to water and water governance for the *dehkan* farms which emerged from the collectivization process. Yet, spillover effects are potentially possible on households through water availability, fee collection, access to information, ability to voice concerns and collective action. This report aimed to explore these different pathways and to consider the possible impact of WUAs on water and land productivity, equity and food security from the perspective of households with a focus on the homestead production system.

The analysis of the role of women in water governance and WUAs suggests that if both USAID and Non-USAID WUAs provide membership to nearly all female-headed *dehkan* farms from their command areas, at the household level interactions with irrigation service providers in the form of meeting attendance, membership, conflict resolution is very limited. This may reflect a lack of confidence among households in the ability of institution, including WUAs, to impact the irrigation challenges they face meaningfully.

As expected, presidential plot and kitchen garden are essential for agricultural production and for food security, especially for households not owning a *dehkan* farm. The production on kitchen gardens is well diversified and almost entirely self-consumed. Vegetables and fruits are usually grown in kitchen gardens and presidential plots are mostly used to grow fodder and cereals. In treated locations more households have access to irrigation for their kitchen garden and they have access to water for a longer period (of months per year) than in control areas. Yet, water theft is not rare and is more often reported in treated villages than in control villages; this questions the ability of WUAs to improve governance and create conflict resolution mechanisms at the village level. In terms of fee collection, most of the households need to pay for the water provided to their kitchen garden and presidential plot and more households need to pay in the treated zone as compared to the control zone. However, confusion exists about the recipients of the payments for water and about the water provider. This indicates a lack of information or lack of clarity on the roles and responsibilities of water stakeholders for the households.

Finally, the results highlight that while traditional notions of the gendered division of labor hold that household cultivation is dominated by women, men primarily make and execute overall agricultural decisions on kitchen, presidential, and *dehkan* farm plots and lead the decisions. Even if women are commonly involved in some tasks, they are not the primary actor or decision maker. It's only for very specific tasks that women household member are primarily responsible: sowing and harvesting of crops on the kitchen plots, storing seeds from the kitchen and presidential plots for use next season, and giving feed to livestock. However, in female-headed households and households from which men migrated, women take on more responsibility for activities and decisions related to land preparation, the tending of crops, as well as harvesting and processing on kitchen, presidential and *dehkan* plots.

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# Impact of Water Users Associations on Water and Land Productivity, Equity and Food Security in Tajikistan

## HOUSEHOLD QUESTIONNAIRE

SECTION 1A-B	<a href="#"><u>IDENTIFICATION</u></a>
SECTION 1C	<a href="#"><u>INDIVIDUAL IDENTIFICATION</u></a>
SECTION 2	<a href="#"><u>FARMLAND</u></a>
SECTION 3	<a href="#"><u>LABOR DIVISION AND DECISION MAKING</u></a>
SECTION 4	<a href="#"><u>AGRICULTURE &amp; WATER MANAGEMENT</u></a>
SECTION 5	<a href="#"><u>TRAINING</u></a>
SECTION 6	<a href="#"><u>PARTICIPATION &amp; GOVERNANCE</u></a>
SECTION 7	<a href="#"><u>FOOD SECURITY</u></a>
SECTION 8	<a href="#"><u>MIGRATION</u></a>
SECTION 9	<a href="#"><u>HOUSEHOLD INCOME</u></a>
SECTION 10	<a href="#"><u>ASSETS</u></a>



## SECTION 1C - INDIVIDUAL IDENTIFICATION

*In this table, fill one line for each household member above 16. All individuals who live together and who take their meals from the same kitchen are considered household members. Individuals continuously absent for more than 6 months are not considered household members and should be excluded.*

Member ID	Name of the member  <i>To be used by the enumerators to easily identify the person mentioned when the member ID is asked.</i>	Relation with the head of the household	Marital status	Year of Birth	Gender	Level of education	Are they a Dehkan farm share holder (listed on certificate)?
		01=Household head    09=Niece/Nephew 02=Spouse            10=Siblings-in-law 03=Children           11=Parents-in-law 04=Grand children    12=Daughter/son-in-law 05=Parents            13=Uncle/Aunts 06=Grand parents    14=Other relatives 07=Siblings            15=Other (specify)___	1=Married 2=Unmarried 3=Widowed 4=Divorced		1=Male 2=Female	1=Primary (grades 1-4) 2=Incomplete primary 3=Secondary (grade 5-10/11) 4=Incomplete secondary 5=Secondary vocational/technical 6=Higher 7=Incomplete higher 8=Post-graduate 9=Other	1=Yes 0=No
01							
02							
03							
04							
05							
06							
07							
08							
09							
10							

[8] What is the member ID of the repondant?..... |\_\_|

[9] How many people under the age of 16 are living in your household? .....|\_\_|

[10] What is the member ID of the Dehkan farm manager? .....|\_\_|

-99=No dehkan farm/Farm manager not a member of HH

## SECTION 2 - AGRICULTUAL LAND & FARM MEMBERSHIP

		[K]	[P]	[D]
		Kitchen Garden	Presidential Plot	Dehkan Farm/rented land
<b>[1]</b>	Does your household have this plot? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1=Yes==>[2] 0=No ==>skip to next plot/column				
<b>[2a]</b>	Total area of your plot owned .....	_ _ _	_ _ _	_ _ _
<b>[2b]</b>	Unit of measurement <span style="float: right;">1=Sotikh      2=Hectare</span>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>[3a]</b>	Total area of cultivated land on plot .....	_ _ _	_ _ _	_ _ _
-8=DK ==>[4] ==> if [3a] is equal to [2a] go to [5], if [3a] is less than [2a], or [2a]=-8 or [3a]=-8 go to [4]				
<b>[3b]</b>	Unit of measurement <span style="float: right;">1=Sotikh      2=Hectare</span>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>[4]</b>	If you don't cultivate the total amount of land owned, why? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1=Lack of funds to invest in land cultivation      6=Other (specify) _____ 2=Lack of time or labor 3=Land infertile or not good for farming 4=Land used for another purpose 5=Land lended or rented to others				
<b>[5]</b>	How far is your plot from your house? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1=Adjacent to the house      4=500 to 1km 2=less than 200m      5=More than 1km 3=300-500m				
<b>[6]</b>	What is the main source of water you use to irrigate your plot? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1=Public water pipe==>8a      6=Drainage canal==>8a 2=Private water pipe==>8a      7=Inner small ditch ==>8a 3=Artesian or water well ==>8a      8=Rainwater ==>8a 4=Natural spring, river or lake==>8a      9=Other (specify) _____ 5=Canal ==>[7]      -8=DK				
<b>[7]</b>	What is the location of your plot along the canal? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1=Head 2=Middle 3=Tail -8=DK				
<b>[8a]</b>	Do you use the water from the [ _ Answer Q6 _ ] for other purposes? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1=Yes ==>[8b1] No==>[9]				
<b>[8b1]</b>	If yes, list the two primary uses of the water from	1st .....	<input type="checkbox"/>	<input type="checkbox"/>
<b>[8b2]</b>	[ _ Answer Q6 _ ] other than irrigation.	2nd .....	<input type="checkbox"/>	<input type="checkbox"/>
1=Cleaning (clothes, dishes, house)      3=Animal drinking water      5=None 2=Household drinking water      4=Bathing				
<b>[9]</b>	What is the legal status of your farm .....			<input type="checkbox"/>
1=Collective Dehkon Farm (Multiple Households)      3=Cooperative Dehkon Farm 2=Individual Dehkon Farm (Single Household)      4=Rented land ==> S3      -8=DK				
<b>[10]</b>	What is the name of your farm? .....			





## SECTION 4A - CROPS

Please indicate all the crops that you cultivated on your kitchen garden in 2015.

If NO Kitchen garden ==> [4]

	[1]	[2]
	Code of the crop	What percentage was kept for self-consumption?
	See codes below	
[a]	_ _	_ _ _ _
[b]	_ _	_ _ _ _
[c]	_ _	_ _ _ _
[d]	_ _	_ _ _ _
[e]	_ _	_ _ _ _
[f]	_ _	_ _ _ _
[g]	_ _	_ _ _ _
[h]	_ _	_ _ _ _
[i]	_ _	_ _ _ _
[j]	_ _	_ _ _ _
[k]	_ _	_ _ _ _
[l]	_ _	_ _ _ _
[m]	_ _	_ _ _ _
[n]	_ _	_ _ _ _
[o]	_ _	_ _ _ _

[3a] What were the main constraints you faced in cultivating your kitchen garden in 2015?

1st |\_|\_|

[3b]

2nd |\_|\_|

[3c]

3rd |\_|\_|

Please indicate all the crops that you cultivated and harvested on your presidential plot in 2015.

If NO presidential plot ==> S4B

	[4]	[5]	[6]	[7]	[8]
	Code of the crop	What was the area under this crop ?	What was the total quantity harvested?		What percentage was kept for self-consumption?
	See codes below	(in sotikh)	Quantity	Unit	
				1=Tons 2=Kg 3=Pieces 4=Bags 5=Other_____	
[a]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[b]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[c]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[d]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[e]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[f]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[g]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[h]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[i]	_ _	_ _ _ _	_ _ _ _	_ _	_ _
[j]	_ _	_ _ _ _	_ _ _ _	_ _	_ _

[9a] What are the main constraints you face in cultivating your presidential plot?

1st |\_|\_|

[9b]

2nd |\_|\_|

[9c]

3rd |\_|\_|

1=Waterlogging	8=Infertile or unproductive land	14=No challenge
2=Lack of irrigation water	9=Pesticide/fertilizer expensive	
4=Seeds/saplings expensive	10=Poor quality of pesticide/fertilizer purchased	
5=Low quality of the seeds/saplings purchased	11=HH members unsupportive	
6=Lack of seed/sapling availability	12=Lack of time	
7=Lack of knowledge	13=Other_____	

### CROP CODES

<b>Technical</b> 01=Sunflower 02=Tobacco 03 = Mustard 04=Cotton  <b>Cereals</b> 11=Barley 12=Maize 13=Rice 14= Wheat 15= Sesame seeds	<b>Beans</b> 21=Kidney 22=Mung 23=Chickpeas  <b>Vegetables</b> 31=Cabbage 32=Capsicum 33=Cucumber 34=Eggplant 35=Tomato 36=Zucchini 37=Pumpkin 38=Green herbs	<b>Root vegetables</b> 41=Beet root 42=Carrot 43=Garlic 44=Onion 45=Potato 46=Radish 47=Turnip	<b>Fruits</b> 51=Apple 52=Apricot 53=Cherry(sour) 54=Grapes 55=Peach 56=Pear 57=Persimmon 58=Plum 59=Pomegranate	60=Quince 61=Sweet cherry 62=Walnut 63= Melon/ watermelon 64= Lemon 65=Almonds 66=Pistachios 67=stawberries 68=saplings 69=Mulberry	<b>Fodder</b> 71=Alfalfa 72=Clover 73=Feed corn 74=Other fodder  <b>Flowers</b> 81=Flowers  <b>Other</b> 91: Specify
--	--	---	---	--	--

## SECTION 4B - INPUTS AND COSTS

*If NO kitchen garden==> [P]  
If NO presidential plot==> S4C*

[K]                      [P]

Kitchen Garden	Presidential Plot
----------------	-------------------

<p><b>[1] Where did your household get seeds for your plots in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Store or market in your district</span> <span>4=NGO or International Organization</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Store or market in another district</span> <span>5=Neighbor or relatives</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3= Government</span> <span>7=Other</span> <span>6=Saved from last season</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
□	□					
□	□					
<p><b>[2] What was the primary challenge in getting seeds in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Not enough funds</span> <span>4=Don't feel comfortable talking with vendors</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Lack of availability</span> <span>5=Other (specify) _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Transport to and from vendor</span> <span>6=No challenge</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[3a] Did you use fertilizers (manure or chemical) in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Yes 0=No</span> <span><i>If NO ==&gt; [4]</i></span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[3b] If yes, how did you apply your primary fertilizer (manure or chemical)?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Own tractor</span> <span>3=By hand sprayer</span> <span>5=Other _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Rented tractor</span> <span>4=By hand</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[3c] Where did your household get fertilizers (manure or chemical) for your plots in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Store or market in your district</span> <span>3= Government</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Store or market in another district</span> <span>5=Neighbor/relatives</span> <span>8=From own livestock (dung)</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>4=NGO or International Organization</span> <span>6=Saved from last season</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[4] What was the primary challenge in getting fertilizer (manure or</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Not enough funds</span> <span>4=Don't feel comfortable talking with vendors</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Lack of availability</span> <span>5=Other (specify) _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Transport to and from vendor</span> <span>6=No challenge</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[5a] Did you use pesticides in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Yes 0=No</span> <span><i>If NO ==&gt; [6]</i></span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[5b] If yes, how did you apply pesticides?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Own tractor</span> <span>3=By hand sprayer</span> <span>5=Other _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Rented tractor</span> <span>4=By hand</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[5c] Where did your household get pesticides for your plots in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Store or market in your district</span> <span>3= Government</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Store or market in another district</span> <span>5=Neighbor/relatives</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>4=NGO or International Organization</span> <span>6=Saved from last season</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[6] What was the primary challenges in getting pesticides in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Not enough funds</span> <span>4=Don't feel comfortable talking with vendors</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Lack of availability</span> <span>5=Other (specify) _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Transport to and from vendor</span> <span>6=No challenge</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[7a] How did you till your land in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Own machinery</span> <span>4=By hand</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Rented machinery</span> <span>5=No tillage ==&gt;go to [8a]</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Animal traction</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[7b] What was the primary challenge for tillage in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Not enough funds</span> <span>4=Lack of equipment</span> <span>7=No challenge</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Lack of man-power</span> <span>5=Weather, climatic conditions</span> <span>8=Other(specify) _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Lack of time</span> <span>6=Physical Pain/illness</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[8a] How did you harvest your primary crops in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Own harvester</span> <span>2=Rented harvester</span> <span>3=By hand</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[8b] What was the primary challenge for harvesting in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Not enough funds</span> <span>4=Lack of equipment</span> <span>7=No challenge</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Lack of man-power</span> <span>5=Weather, climatic conditions</span> <span>8=Other(specify) _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Lack of time</span> <span>6=Physical Pain/illness</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[9a] Where did you market your crops from these plots in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Village/jamoat Market to final purchaser</span> <span>6=Home to middle-man</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Village/jamoat market to middle-man</span> <span>7=Roadside</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=District/Urban market to final purchaser</span> <span>8=Government plant</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>4=District /Urban market to middle-man</span> <span>9=Other _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>5=Home to final purchaser</span> <span>10=No desire to sell</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>[9b] What was the primary challenge for marketing your crops in 2015?</b> .....</p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Low price</span> <span>5=Weather, climatic conditions</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Low quality of the crops</span> <span>6=Other (specify) _____</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Lack of time</span> <span>7=No challenge</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>4=Transport constraint</span> <span>8=No interest in product from buyers / no one bought</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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## SECTION 4C - IRRIGATION & WATER MANAGEMENT

*If no kitchen garden==> [P]  
If no presidential plot==> S4D*

[K]                      [P]

Kitchen Garden	Presidential Plot
----------------	-------------------

<p><b>[1] So, your _____ [kitchen garden/presidential plot] is irrigated by ____ [Answer from S2Q6], how do you bring water to your crops?</b></p> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>1=Furrow</span> <span>4=Watering can (by hand)</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>2=Sprinkler</span> <span>5=Hoes</span> </div> <div style="border: 1px solid black; padding: 5px; display: flex; justify-content: space-between;"> <span>3=Drip irrigation</span> <span>6=Other _____</span> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p><b>Which months of the year do you need irrigation water to water your crops?</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p style="text-align: right;"><b>[2a]</b> January.....</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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<p style="text-align: right;"><b>[2b]</b> February.....</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">□</td><td style="width: 50%; text-align: center;">□</td></tr> </table>	□	□
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[2c] March.....	<input type="checkbox"/>	<input type="checkbox"/>
[2d] April.....	<input type="checkbox"/>	<input type="checkbox"/>
[2e] May.....	<input type="checkbox"/>	<input type="checkbox"/>
[2f] June.....	<input type="checkbox"/>	<input type="checkbox"/>
[2g] July.....	<input type="checkbox"/>	<input type="checkbox"/>
[2h] August.....	<input type="checkbox"/>	<input type="checkbox"/>
[2i] September.....	<input type="checkbox"/>	<input type="checkbox"/>
[2j] October.....	<input type="checkbox"/>	<input type="checkbox"/>
[2k] November.....	<input type="checkbox"/>	<input type="checkbox"/>
[2l] December.....	<input type="checkbox"/>	<input type="checkbox"/>

Which months of the year do you receive irrigation water to water your crops?

1=Yes 0=No

[3a] January.....	<input type="checkbox"/>	<input type="checkbox"/>
[3b] February.....	<input type="checkbox"/>	<input type="checkbox"/>
[3c] March.....	<input type="checkbox"/>	<input type="checkbox"/>
[3d] April.....	<input type="checkbox"/>	<input type="checkbox"/>
[3e] May.....	<input type="checkbox"/>	<input type="checkbox"/>
[3f] June.....	<input type="checkbox"/>	<input type="checkbox"/>
[3g] July.....	<input type="checkbox"/>	<input type="checkbox"/>
[3h] August.....	<input type="checkbox"/>	<input type="checkbox"/>
[3i] September.....	<input type="checkbox"/>	<input type="checkbox"/>
[3j] October.....	<input type="checkbox"/>	<input type="checkbox"/>
[3k] November.....	<input type="checkbox"/>	<input type="checkbox"/>
[3l] December.....	<input type="checkbox"/>	<input type="checkbox"/>

[4a] Are you informed in advance of the approximate day your irrigation water will arrive? ..... 1=Yes 0=No

[4b] If no, is this problematic for you? ..... 1=Yes 0=No

[4c] What time of day does your water begin to flow? .....

- 1=Early Morning/Morning (Sunrise-12:00PM)      3=Evening/Night (After dark)  
 2=Afternoon (After 12:00PM-Dark)      4=Varies      5=Continuous flow

[4d] Is the time of day uncomfortable for you? ..... 1=Yes 0=No

[5] Are you satisfied with the quantity of water for irrigation received/available? .....

- 1=Very satisfied      3=Unsatisfied  
 2=Satisfied      4=Very unsatisfied

[6] Has a neighbor ever taken irrigation water without permission or stolen irrigation water intended for this plot from you?

[7] Have you or a family member ever taken water without permission or stolen irrigation water from a neighbor to ensure the adequate irrigation of this plot? ..... 1=Yes 0=No

[8a] Do you know who provides water to your plots? ..... 1=Yes 0=No      If NO ==> [7a]

[8b] If yes, who is it? .....

- 1=Other farmers      5=Local NGO      9= Mirob  
 2=Vodhoz      6=International donor  
 3=Jamoat      7= Govt (District/National)  
 4=WUA/LISP      8=Other (specify):

[9a] Do you need to pay for this water? ..... If NO ==> [9]

[9b] If yes, how much did you pay in 2015? (Somoni) .....

[9c] Who were the fees paid to? .....

- 1=Jamoat      4=Vodhoz      -8=DK  
 2=LISP/WUA office      5=Owner of infrastr.      7= Other \_\_\_\_\_  
 3=Local mirab      6= Tajik electricity

[10] How would you rate, overall, the condition of the infrastructure (water course or other) that supplied water to your plot? .....

- 1=Excellent      2=Good      3=Poor      4=Very poor  
 -8. DK

[11] In the last 5 years was there any major action to rehabilitate the infrastructure that supplies water to your crop? .....

- 1=Yes      2= partially      0= No If NO ==> [13]      -8 DK ==> [13]

[12] If yes, who made the repairs ? .....

- 1=Farmers      4=WUA/LISP      7= Government      9= Mirob  
 2=Vodhoz      5=Local NGO      8=Other \_\_\_\_\_      -8. DK  
 3=Jamoat      6=International donor

Please recall the contributions of your household in 2015 for the maintenance (weeding, digging...) of the source of water that services your plot

[13] Labor contributions      Number of days .....

[14]      Number of persons .....

[15] In cash payments (Somoni) .....

### SECTION 4D - LIVESTOCK

[1] How many of the following animals did your household own in 2015?

Include young animals

- [a] Cows and bulls   
 [b] Sheep .....  
 [c] Goats .....  
 [d] Horses .....  
 [e] Donkeys .....

- [f] Rabbits .....  
 [g] Chicken and poultry .....  
 [h] Bees (number of hives) .....  
 [i] Other .....

If all 00==> Section 5

[2] Where did your cows, donkeys, horses, goats or sheep graze the majority of the time in 2015?

1=Near the home/kitchen garden	4=Near canals or in canals	7=Other _____	10= Outskirts of village (Herd)
2=Own presidential plot	5=Private field of others	8=Don't own any of these animals	
3=Own dehkan farm	6=Public spaces	9=Summer Pasture	

- [3] What percentage of your household milk products was self-consumed in 2015? .....99=No production | | |
- [4] What percentage of your household eggs production was self-consumed in 2015? .....99=No production..... | | |
- [5] What percentage of your household meat production was self-consumed in 2015? .....99=No production | | |
- [6a] Did you sell products from your animals (milk, meat, eggs, leather, wool, honey...) in 2015? .....1=Yes 0=No | If NO==>S5 | |
- [6b] If yes, what was the amount received from those sales in 2015? (Somoni) ..... | | | | | | |

## SECTION 5 - TRAINING

**[1] Have you or any member of your household benefited from trainings related to water and land management, crop cultivation or WUA governance in the last 5 years?.....**  **Yes**  **No** *If NO ==> Q6*

1 = Yes 0=No

[2]	[3]	[4]	[5]
<b>Who attended the training?</b>  <i>Use the individual ID from Section 1c</i>	<b>Type of training</b>  <i>See below the list of trainings</i>	<b>Who organized the training?</b>  1=WUA 2=Farmer group 3=USAID 4=World Bank 5= Other donor 6=Local government/Jamoat 7=Agricultural extension services 8 =Vodkhoz -8. DK	<b>What was the most important change induced by this training?</b>  0=No change 1=Adopted new irrigation methods 3=Levelled the field 4=Access to agricultural loans/credits 5=Installed water meter/started measuring water 6=Started growing new crops 7=Reduced water disputes 8 = Other _____ -8. DK
[a] <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
[b] <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
[c] <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
[d] <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
[e] <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Training codes

1=WUA governance	11=On-farm irrigation and water management	18=Loans, grants or financial management
2=Organizational and leadership skills development for WUA	12=Water measurement	19=On-farm crop cultivation/agronomy
3=Financial management	13=Construction of hydroposts	20=Growing high value crops
4=Grant management	14=Other technical training on water	21=Post-harvest marketing and processing
5=Maintenance and operation of irrigation systems	15=Household gardening	22=Agricultural loan management
6=Water dispute resolution	16=Operation of agromachinery	23=Raising livestock
7=Other training on water governance	17=Nutrition	24=Other technical training on agriculture

**[6] If you did not participate in any trainings, what was the main reason? .....**

1=No trainings offered or unaware	6=Not allowed by family
2=Not interested	7=Other (specify)_____
3=No time	8= Only men are going, women are not going
4=Not useful	9=Not invited
5=Difficulty commuting to training	

## SECTION 6A - COMMUNITY PARTICIPATION

[0] Are you or any member of your household a member of a group? 0=No=>6B 1=Yes |\_\_|

	[1a]	[1b]	[2a]	[2b]
	Select the type of group to which YOU belong. <small>0=No 1=Yes</small>	If other, what is the type of activity of this group?	Select the type of group to which one or more member of your household belong. <small>0=No 1=Yes</small>	If other, what is the type of activity of this group?
[a] Agricultural group	__		__	
[b] Livestock management group	__		__	
[c] WUA	__		__	
[d] Other (specify) _____	__		__	

## SECTION 6B: WATER GOVERNANCE

*In this section YOU refers to the respondent.*

[1] Is there a WUA in your village or jamoat? .....|\_\_|  
0=No 1=Yes -8=DK

[2] Have you ever interacted with the WUA or service provider? .....|\_\_| If NO ==> [5]  
0=No 1=Yes

[3] If yes, for which purposes? 0=No 1=Yes

	[a]	Conflict resolution ..... __	
	[b]	Fees payment ..... __	
	[c]	Requesting water application/checkin g water schedule ..... __	
	[d]	Infrastructure maintenance ..... __	
	[e]	Trainings ..... __	
	[f]	Participation in meetings ..... __	
	[g]	Other _____ ..... __	

[4] Are you a member of the WUA? .....|\_\_|  
0=No 1=Yes

[5] Do you attend meetings of the WUA or service provider? .....|\_\_| If YES ==> [7]  
0=No 1=Yes

[6] If no, what is the reason for not attending? .....|\_\_| ==> [9]

<b>CODES [6]</b>	4=Not useful	8=Not comfortable in meetings/Only men attending, women not attending
1=Meetings not conduc	5=Diffculty in commuting	
2=Not interested	6=Not allowed by family	9=Other (specify) _____
3=No time	7=Not able to pay fees	10=Not invited
		11=Someone else from HH is going

[7] If yes, during meetings where decisions or plans are made, do you share your opinions with the group?.... |\_\_|  
0=No 1=Yes

[8] Do you feel your opinions are listened to at meetings? .....|\_\_|  
0=No 1=Yes

[9] If you were to have problem related to water for irrigation who would you speak with first? ..... |\_\_|

1=Neighbors	5=Local NGO	9= Mirob	-8. DK
2=Vodhoz	6=International donor	10=Community leader	
3=Jamoat	7= Govt (District/National)	11= Family member	
4=WUA/LISP	8=Other (specify) _____		

## SECTION 7 - FOOD SECURITY

Please think about your food consumption in 2015. We are now going to ask you about the occurrence of a food shortage over the past year. We consider a food shortage when you were required to cut the size of your meals or skip meals, because of insufficient money for food or no stock of food.

Select the month you had food shortage in 2015.

0=No food shortage      1= Food shortage

- |                       |                        |
|-----------------------|------------------------|
| [1] January .....  __ | [7] July .....  __     |
| [2] February ..... __ | [8] August .....  __   |
| [3] March ..... __    | [9] September ..... __ |
| [4] April ..... __    | [10] October .....  __ |
| [5] May .....  __     | [11] November ..... __ |
| [6] June ..... __     | [12] December ..... __ |

Last year did you take any of the following measures to provide food for your household?

0=No    1=Yes

- [13] Rely on cheap, less expensive and less preferable food ..... |\_\_|
- [14] Reduce the quantity of household intake of food or skip a meal ..... |\_\_|
- [15] Spend days without eating any food ..... |\_\_|
- [16] Borrow money from relatives/friends for food ..... |\_\_|
- [17] Purchased food on credit (from shops, others) ..... |\_\_|
- [18] Eat crop seed which was stored to be used later in cultivation ..... |\_\_|
- [19] Sell (or exchange) any useable household items..... |\_\_|

[20a] In the past [4 weeks/30 days], was there ever no food to eat of any kind in your house because of lack of resources to get food? ..... |\_\_|

0=No==>[21a]  
1=Yes

[20b] How often did this happen in the past [4 weeks/30 days]? .....|\_\_|

1=Rarely (1-2 times)      2=Sometimes (3-10 times)      3=Often (more than 10 times)

[21a] In the past [4 weeks/30 days], did you or any household member go to sleep at night hungry because there was not enough food? ..... |\_\_|

0=No==>[22a]  
1=Yes

[21b] How often did this happen in the past [4 weeks/30 days]? .....|\_\_|

1=Rarely (1-2 times)      2=Sometimes (3-10 times)      3=Often (more than 10 times)

[22a] In the past [4 weeks/30 days], did you or any household member go a whole day and night without eating anything at all because there was not enough food? ..... |\_\_|

0=No==>[S8]  
1=Yes

[22b] How often did this happen in the past [4 weeks/30 days]? .....|\_\_|

1=Rarely (1-2 times)      2=Sometimes (3-10 times)      3=Often (more than 10 times)



## SECTION 9A. HOUSEHOLD INCOME

**[0] Apart from the sale of household agriculture and livestock, do any other activities bring income to your household, such as wage labor or picking cotton?**

|\_|

1=Yes 0=No

*If NO ==> [5]*

*Indicate all the income generating activities (IGA) in 2015 in this table. Enumerators will ask the activities for each of the HH adult members listed in S1C.*

**I will now ask you details about the income generating activities you completed in 2015.**

*If the household has more than 10 IGA, concentrate on the 10 most important ones in terms of income. If one activity is done by several members, several rows have to be filled.*

[1a]	[1b]	[2]	[3]	[4]
<b>Individual ID</b>  <i>From section 1C</i>  22=Children from the HH	<b>Does (HH member name) participate in any income earning activities?</b>  1=Yes==>[2] 0=No==>next HH member	<b>What activity do they participate in? (Code of the IGA)</b> <i>If several activities, fill several lines for the same member.</i>	<b>What was the total amount they earned from this activity last year?</b> <i>If in kind, estimate the amount.</i> (Somoni)  -8=DK	<b>How far does she/he work from your home? (km)</b>  1=At home/adjacent to 2=less than 200m 3=300-500m 4=500 to 1km 5=More than 1km  -8=DK
01	_	_	_ _ _ _ _ _ _	_
02	_	_	_ _ _ _ _ _ _	_
03	_	_	_ _ _ _ _ _ _	_
04	_	_	_ _ _ _ _ _ _	_
05	_	_	_ _ _ _ _ _ _	_
06	_	_	_ _ _ _ _ _ _	_
07	_	_	_ _ _ _ _ _ _	_
08	_	_	_ _ _ _ _ _ _	_
09	_	_	_ _ _ _ _ _ _	_
10	_	_	_ _ _ _ _ _ _	_
22	_	_	_ _ _ _ _ _ _	_

Code of the IGA		
01=Handicrafts	21=Petty commerce	31=Teacher
02=Sewing	11=Laborer on Dehkon farm	22=Commerce
03=Masonry	12=Laborer on Collective Farm	23=Factory worker
04=Carpentry	13=Herder/Shepard	33=Village doctor
05=Driving Taxi	14=Butcher	34=Governement employee
06=Driving Truck	15=Baker	35=Non governement
07=Driving Tracto	16=Selling firewood	37=Military employment
		36=Other _____

**[5a] What were your primary sources of income in 2015? (select up to 1st |\_|)**

**[5b] three from the list and write in order of amount) 2nd |\_|**

**[5c] 3rd |\_|**

**[6a] What were your primary sources of income in 2010? (select up to 1st |\_|)**

**[6b] three from the list and write in order of amount) 2nd |\_|**

**[6c] 3rd |\_|**

Primary Income sources		
1=Dehkan Farm crop sales	6=Non-agricultural wage labor (making bricks)	88=HH did not exist in 2010
2=Kitchen garden or Presidential crop sales	7=Remittances	11=Small business
3=Agricultural Wage Labor	8=Pensions	12=Agricultural Salaried Employment
4=Livestock and Poultry product or animal sales	9=Inheritance or gift	13=Taxi or truck driver
5=Non-Agricultural Salaried Employment	10=Relative who lives out	14=Sale of handicrafts
		15=Other

**[7] How has your income amount changed over the last five years? .....**

0=No Change	2=Slight decrease	4=Significant decrease
1=Slight increase	3=Significant increase	-8=DK

## SECTION 9B. CREDITS AND LOANS

[1] Did your household take a loan or purchase anything on credit in 2015? .....  Yes  No

If NO ==> S10

[2] What was the primary purpose of the loan taken? .....

1=Debt on land	5=minor agricultural inputs(buying seeds, fertilizers)	
2=irrigation water	6=major agricultural investments (modern farm machinaries)	
3=basic food items	7=investment in livestock farming	9=Taxes
4=health/medical	8= investment in non-agricultural business	10=Other

[3] To whom does your household owe the most money? .....

1=Local store	5=Government plant / Zavo	9=Local money lender
2=Neighbors	6=Service providers	10=Futures compagny
3=Relatives/friends	7= Jamoat (debt on the la	11=Other
4=Banks	8=Microfinance institution	

## SECTION 10 - HOUSEHOLD ASSETS

**[1] What type of housing do you live in?** .....|\_\_|

1=Independent house -8. DK	2=Shared house	3=Temporary accomodation	4=Other
-------------------------------	----------------	--------------------------	---------

**[2] What is the main source of drinking water for your household?** .....|\_\_|

1=Public water pipe	3=Artesian or water well	5=Canal -8. DK
2=Water pipe inside the house	4=Natural spring, river or lake	5=Other

**[3] What is the main source of heating?** .....|\_\_|

1=Electric heating	3=Gas heating	5=Other 6=Guzapoya
2=Stove/wood & coal heating	4=Nothing	-8. DK

**[4] What is the main fuel for cooking?** .....|\_\_|

1=Electric	3=Gas	5=Dung	6=Other
2=Wood	4=Guzapoya	-8. DK	

**[5] What is the material of the flooring in your house?** .....|\_\_|

1=Cement	3=Mud	5=Other
2=Tiles/terrazzo	4=Wood	-8. DK

**[6] What is the material of the walls in your house?** .....|\_\_|

1=Mud/earth	3=Stone	5=Wood -8. DK
2=Burnt bricks	4=Cement blocks/Concrete	6=Other

**[7] What is the material of the roof on your house?** .....|\_\_|

1=Metal sheets	3=Asbestos	5=Other
2=Tiles/terrazzo	4=Wood	-8. DK

**[8] Does your household own the following assets?** 1= yes 0=No -8. DK

<p>[a] Main dwelling ..... __ </p> <p>[b] Another house or apartment .... __ </p> <p>[c] Bicycle ..... __ </p> <p>[d] Motorcycle, scooter ..... __ </p> <p>[e] Car, minibus, truck ..... __ </p> <p>[f] Refrigerator ..... __ </p> <p>[g] Air conditioner ..... __ </p> <p>[h] Sewing machine ..... __ </p> <p>[i] Washing machine..... __ </p>	<p>[j] Pump ..... __ </p> <p>[k] Cultivator ..... __ </p> <p>[l] Personal computer / Laptop .. __ </p> <p>[m] Satellite dish ..... __ </p> <p>[n] Electric heater..... __ </p> <p>[o] Television..... __ </p> <p>[p] Tractor..... __ </p> <p>[q] Mobile phone..... __ </p> <p>[r] Greenhouse..... __ </p>
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### For Interviewer only

**[1] Were male members of the household present during the interview?** .....|\_\_| 1=Yes 0=No

**[2] Did male members intervene during the interview?** .....|\_\_| 1=Yes 0=No

**[3] Did the respondent ask for assistance or cofirmation from male members during the interv** |\_\_| 1=Yes 0=No

**[4] Did you feel the respondent gave thoughtful and realistic responses?** .....|\_\_| 1=Yes 0=No

**[5] Please note other issues raised by the respondent or anything of note that took place during the interview:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[6] Was the questionnaire primary conducted in Uzbek or Tajik?** 1=Tajik 2=Uzbek |\_\_|

**[7] Phone number** .....|\_\_|

**[8] Time at the end of the interview**.....|\_\_| : |\_\_| *Indicate 14:30 if it is 2:30 pm*

## ANNEX 2 – TABLES FOR LABOR DIVISION

**Table 24 - Primary actor for labor in male and female headed households (average %)**

Plot	Gender of the HH Head	Male MOH	Female MOH	Children From HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Total
Kitchen	Female [n=259] <sup>1</sup>	44.19	49.88	1.4	3.85%	0.3%	0.67	100
	Male [n=1638]	57.20	37.80	1.1	3.30%	0.0%	0.5	100
Presidential	Female [n=98]	68.34	28.03	0.57	9.58%	0.14%	1.01	100
	Male [n=553]	75.28	19.90	0.74	9.78%	0.26%	0.17	100
Dehkon	Female [n=28]	61.64	19.41	0.15	14.56%	1.12%	3.11	100
	Male [n=248]	68.78	12.30	0.48	14.20%	1.17%	3.08	100

Source: Survey data collected by authors in 2016.

**Table 25- Primary actor for labor on migrant and non-migrant households (average %)**

Plot	HH Migrant Status	Male MOH	Female MOH	Children From HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Total
Kitchen	Non-migrant [n=1005]	58.35	36.68	1.11	3.38	0.04	0.45	100
	Migrant [n=892]	52.12	42.67	1.18	3.49	0.02	0.52	100
Presidential	Non-migrant [n=324]	69.59	19.42	0.76	9.00	0.31	0.92	100
	Migrant [n=327]	68.16	19.92	0.73	8.98	0.10	2.12	100
Dehkon	Non-migrant [n=166]	69.21	11.19	0.41	14.26	1.40	3.52	100
	Migrant [n=110]	67.21	15.70	0.46	13.26	0.89	2.49	100

**Table 26 - Primary actor for labor in households in control and treatment jamoats (average %)**

Plot	Treatment Status	Male MOH	Female MOH	Children From HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Total
Kitchen	Control [n=964]	56.45	39.19	1.09	2.78	0.03	0.47	100
	Treated [n=933]	54.43	39.84	1.21	3.99	0.03	0.49	100
Presidential	Control [n=391]	68.31	20.23	0.59	8.73	0.24	1.91	100
	Treated [n=260]	70.04	18.58	1.00	9.45	0.21	0.73	100
Dehkon	Control [n=166]	68.73	12.35	0.33	13.77	1.01	3.81	100
	Treated [n=110]	68.11	13.83	0.57	13.95	1.50	2.04	100

<sup>1</sup> The sample size (n) represents the maximum number of households that could be included in calculations. In calculating the proportion of households which named one of the above individuals as the primary actor for any plot task, households that did not complete the tasks in question were excluded and so the sample size for each task varied.

**Table 27 - Overall Division of Labor Across Plots**

Category	Activity	Plot	Male MOH	Female MOH	Children from HH	Male Laborer	Female Laborer	Other Farm Member	Total	
Preparation	Purchases Inputs	K	69.86%	29.81%	0.06%	0.11%	0.00%	0.17%	100.00%	
		P	82.76%	15.53%	0.00%	1.02%	0.00%	0.68%	100.00%	
		D	88.68%	7.92%	0.00%	1.13%	0.00%	2.26%	100.00%	
	Breaks-up soil/makes rows	K	62.67%	24.52%	2.72%	9.34%	0.05%	0.70%	100.00%	
		P	49.40%	5.28%	0.56%	41.43%	0.19%	3.15%	100.00%	
		D	43.68%	2.15%	0.24%	49.40%	0.24%	4.30%	100.00%	
	Plants seeds/saplings	K	45.83%	53.20%	0.65%	0.22%	0.05%	0.05%	100.00%	
		P	77.48%	18.49%	0.50%	2.86%	0.17%	0.50%	100.00%	
		D	70.37%	8.15%	0.00%	16.30%	1.11%	4.07%	100.00%	
	Ploughs	K	49.69%	16.98%	1.59%	29.31%	0.07%	2.36%	100.00%	
		P	30.57%	1.73%	0.00%	64.94%	0.00%	2.76%	100.00%	
		D	26.32%	1.50%	0.00%	69.17%	0.00%	3.01%	100.00%	
	Maintains Agro-machinery	All	80.88%	6.84%	0.70%	10.79%	0.18%	0.61%	100.00%	
	Tending Crops	Weeds	K	12.67%	85.85%	0.93%	0.33%	0.16%	0.05%	100.00%
			P	23.60%	72.34%	0.97%	0.97%	1.16%	0.97%	100.00%
D			24.18%	59.43%	1.23%	2.05%	5.33%	7.79%	100.00%	
Prunes Fruit Trees		K	82.75%	14.33%	1.18%	1.68%	0.00%	0.06%	100.00%	
		P	83.62%	10.34%	0.00%	0.86%	0.00%	5.17%	100.00%	
		D	87.96%	6.48%	0.00%	1.85%	1.85%	1.85%	100.00%	
Applies Irrigation Water		K	67.97%	30.15%	1.76%	0.09%	0.00%	0.03%	100.00%	
		P	86.95%	9.13%	1.79%	1.79%	0.00%	0.34%	100.00%	
		D	89.23%	4.88%	0.61%	2.64%	0.00%	2.64%	100.00%	
Cleans Irrigation Canals		K	76.91%	16.59%	2.92%	1.54%	0.00%	2.05%	100.00%	
		P	84.22%	7.36%	2.28%	2.10%	0.00%	4.03%	100.00%	
		D	86.97%	1.68%	2.94%	5.25%	0.00%	3.15%	100.00%	
Applies Pesticide		K	72.43%	25.89%	1.14%	0.53%	0.00%	0.00%	100.00%	
		P	87.02%	8.17%	1.92%	1.68%	0.00%	1.20%	100.00%	
		D	81.04%	1.90%	0.47%	15.17%	0.47%	0.95%	100.00%	
Applies Fertilizer		K	67.65%	31.42%	0.62%	0.31%	0.00%	0.00%	100.00%	
		P	86.89%	10.75%	0.18%	1.46%	0.00%	0.73%	100.00%	
		D	76.64%	4.51%	0.00%	18.03%	0.00%	0.82%	100.00%	
Speaks with neighbor in event of water conflict		All	62.18%	37.44%	0.00%	0.13%	0.00%	0.26%	100.00%	
Speaks with ISP if water not received		All	76.86%	22.49%	0.20%	0.13%	0.00%	0.33%	100.00%	
Feeds livestock		All	27.60%	66.36%	5.84%	0.00%	0.06%	0.13%	100.00%	
Processing and Marketing	Harvests, Processes & Stores Crops	K	26.78%	72.21%	0.64%	0.14%	0.03%	0.20%	100.00%	
		P	59.05%	35.66%	1.17%	2.80%	0.54%	0.78%	100.00%	
		D	49.83%	28.32%	0.46%	9.25%	6.36%	5.78%	100.00%	

	Negotiates Sale of Crops	K	61.93%	36.54%	0.00%	0.66%	0.00%	0.88%	100.00%
		P	80.79%	16.56%	0.00%	1.99%	0.66%	0.00%	100.00%
		D	86.93%	10.23%	0.00%	1.14%	0.00%	1.70%	100.00%
	Stores Seeds	K	23.49%	76.23%	0.14%	0.14%	0.00%	0.00%	100.00%
		P	45.56%	53.02%	0.00%	1.01%	0.20%	0.20%	100.00%
		D	62.16%	36.04%	0.00%	0.00%	0.00%	1.80%	100.00%
	Hires and Manages Laborers	P	87.06%	10.24%	0.00%	1.89%	0.27%	0.54%	100.00%
		D	84.62%	8.17%	0.00%	2.40%	1.44%	3.37%	100.00%

**Table 28- Division of Labor Across Plots by Gender of Household Head**

Category	Activity	Plot	HH Head	Male MOH	Female MOH	HH Children	Male Laborer	Female Laborer	Other Farm Member	Total	
Preparation	Purchases Inputs	K	Male	73.68%	26.07%	0.06%	0.06%	0.00%	0.13%	100.00%	
			Female	45.53%	53.66%	0.00%	0.41%	0.00%	0.41%	100.00%	
		P	Male	86.60%	11.60%	0.00%	1.20%	0.00%	0.60%	100.00%	
			Female	60.47%	38.37%	0.00%	0.00%	0.00%	1.16%	100.00%	
		D	Male	89.87%	7.17%	0.00%	1.27%	0.00%	1.69%	100.00%	
			Female	78.57%	14.29%	0.00%	0.00%	0.00%	7.14%	100.00%	
	Breaks-up soil/makes rows	K	Male	64.34%	23.14%	2.62%	9.06%	0.06%	0.78%	100.00%	
			Female	52.08%	33.27%	3.37%	11.09%	0.00%	0.20%	100.00%	
		P	Male	49.67%	5.02%	0.66%	41.16%	0.22%	3.28%	100.00%	
			Female	47.85%	6.75%	0.00%	42.94%	0.00%	2.45%	100.00%	
		D	Male	43.42%	2.37%	0.26%	49.47%	0.26%	4.21%	100.00%	
			Female	46.15%	0.00%	0.00%	48.72%	0.00%	5.13%	100.00%	
	Plants seeds/saplings	K	Male	47.38%	51.74%	0.62%	0.19%	0.00%	0.06%	100.00%	
			Female	35.97%	62.45%	0.79%	0.40%	0.40%	0.00%	100.00%	
		P	Male	79.22%	16.86%	0.59%	2.55%	0.20%	0.59%	100.00%	
			Female	67.06%	28.24%	0.00%	4.71%	0.00%	0.00%	100.00%	
		D	Male	71.49%	7.02%	0.00%	15.70%	1.24%	4.55%	100.00%	
			Female	60.71%	17.86%	0.00%	21.43%	0.00%	0.00%	100.00%	
	Ploughs	K	Male	50.93%	15.87%	1.54%	29.07%	0.08%	2.51%	100.00%	
			Female	42.31%	23.56%	1.92%	30.77%	0.00%	1.44%	100.00%	
		P	Male	29.03%	1.61%	0.00%	66.33%	0.00%	3.02%	100.00%	
			Female	39.76%	2.41%	0.00%	56.63%	0.00%	1.20%	100.00%	
		D	Male	27.31%	1.68%	0.00%	67.65%	0.00%	3.36%	100.00%	
			Female	17.86%	0.00%	0.00%	82.14%	0.00%	0.00%	100.00%	
	Maintains Agro-machinery	All	Male	83.15%	5.12%	0.70%	10.23%	0.20%	0.60%	100.00%	
			Female	65.03%	18.88%	0.70%	14.69%	0.00%	0.70%	100.00%	
	Tending Crops	Weeds	K	Male	12.63%	85.92%	0.88%	0.32%	0.19%	0.06%	100.00%
				Female	12.96%	85.43%	1.21%	0.40%	0.00%	0.00%	100.00%
P			Male	22.47%	73.26%	1.12%	0.90%	1.12%	1.12%	100.00%	
			Female	30.56%	66.67%	0.00%	1.39%	1.39%	0.00%	100.00%	
D			Male	25.00%	58.64%	1.36%	2.27%	5.00%	7.73%	100.00%	
			Female	16.67%	66.67%	0.00%	0.00%	8.33%	8.33%	100.00%	
Prunes Fruit Trees		K	Male	84.56%	12.86%	1.10%	1.49%	0.00%	0.00%	100.00%	
			Female	71.01%	23.95%	1.68%	2.94%	0.00%	0.42%	100.00%	
		P	Male	83.00%	10.00%	0.00%	1.00%	0.00%	6.00%	100.00%	
			Female	87.50%	12.50%	0.00%	0.00%	0.00%	0.00%	100.00%	
		D	Male	89.32%	4.85%	0.00%	1.94%	1.94%	1.94%	100.00%	
			Female	60.00%	40.00%	0.00%	0.00%	0.00%	0.00%	100.00%	
Applies Irrigation Water		K	Male	70.47%	27.58%	1.81%	0.10%	0.00%	0.03%	100.00%	
			Female	52.37%	46.19%	1.44%	0.00%	0.00%	0.00%	100.00%	
		P	Male	87.93%	8.25%	1.71%	1.71%	0.00%	0.40%	100.00%	
			Female	81.46%	14.04%	2.25%	2.25%	0.00%	0.00%	100.00%	
		D	Male	89.82%	4.52%	0.68%	2.49%	0.00%	2.49%	100.00%	
			Female	84.00%	8.00%	0.00%	4.00%	0.00%	4.00%	100.00%	
Cleans Irrigation Canals		K	Male	79.04%	14.78%	2.72%	1.60%	0.00%	1.85%	100.00%	
			Female	63.44%	27.97%	4.19%	1.10%	0.00%	3.30%	100.00%	
		P	Male	85.68%	6.59%	2.16%	1.96%	0.00%	3.60%	100.00%	
			Female	75.88%	11.76%	2.94%	2.94%	0.00%	6.47%	100.00%	
		D	Male	86.01%	1.63%	3.03%	5.83%	0.00%	3.50%	100.00%	
			Female	95.74%	2.13%	2.13%	0.00%	0.00%	0.00%	100.00%	

	Applies Pesticide	K	Male	74.65%	23.78%	1.05%	0.52%	0.00%	0.00%	100.00%	
			Female	57.40%	40.24%	1.78%	0.59%	0.00%	0.00%	100.00%	
		P	Male	87.47%	7.80%	1.95%	1.39%	0.00%	1.39%	100.00%	
			Female	84.21%	10.53%	1.75%	3.51%	0.00%	0.00%	100.00%	
		D	Male	79.20%	1.60%	0.80%	17.60%	0.00%	0.80%	100.00%	
			Female	83.72%	2.33%	0.00%	11.63%	1.16%	1.16%	100.00%	
	Applies Fertilizer	K	Male	69.59%	29.48%	0.65%	0.00%	0.00%	0.29%	100.00%	
			Female	54.76%	44.29%	0.48%	0.00%	0.00%	0.48%	100.00%	
		P	Male	88.42%	9.47%	0.21%	1.26%	0.00%	0.63%	100.00%	
			Female	77.03%	18.92%	0.00%	2.70%	0.00%	1.35%	100.00%	
		D	Male	72.60%	3.42%	0.00%	23.29%	0.00%	0.68%	100.00%	
			Female	82.65%	6.12%	0.00%	10.20%	0.00%	1.02%	100.00%	
	Speaks with neighbor in event of irrigation water conflict	All	Male	68.24%	31.31%	0.00%	0.15%	0.00%	0.30%	100.00%	
			Female	27.19%	72.81%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Speaks with Irrigation service provider	All	Male	81.74%	17.73%	0.15%	0.15%	0.00%	0.23%	100.00%	
			Female	44.83%	53.69%	0.49%	0.00%	0.00%	0.99%	100.00%	
	Feeds livestock	All	Male	27.83%	66.15%	5.88%	0.00%	0.00%	0.15%	100.00%	
			Female	26.02%	67.86%	5.61%	0.00%	0.51%	0.00%	100.00%	
	<b>Processing and Marketing</b>	Harvests, Processes & Stores Crops	K	Male	27.30%	71.86%	0.58%	0.10%	0.03%	0.13%	100.00%
				Female	23.35%	74.52%	1.06%	0.42%	0.00%	0.64%	100.00%
P			Male	59.04%	35.24%	1.27%	3.09%	0.54%	0.82%	100.00%	
			Female	59.14%	38.17%	0.54%	1.08%	0.54%	0.54%	100.00%	
D			Male	51.63%	26.92%	0.52%	8.97%	6.37%	5.59%	100.00%	
			Female	35.42%	39.58%	0.00%	11.46%	6.25%	7.29%	100.00%	
Negotiates Sale of Crops		K	Male	64.49%	33.68%	0.78%	0.78%	0.00%	0.26%	100.00%	
			Female	47.37%	50.00%	0.00%	1.32%	0.00%	1.32%	100.00%	
		P	Male	83.20%	13.60%	0.00%	2.40%	0.80%	0.00%	100.00%	
			Female	69.23%	30.77%	0.00%	0.00%	0.00%	0.00%	100.00%	
		D	Male	87.42%	9.43%	0.00%	1.26%	0.00%	1.89%	100.00%	
			Female	82.35%	17.65%	0.00%	0.00%	0.00%	0.00%	100.00%	
Stores Seeds		K	Male	24.61%	75.22%	0.00%	0.08%	0.00%	0.08%	100.00%	
			Female	15.93%	82.97%	0.00%	0.55%	0.00%	0.55%	100.00%	
		P	Male	47.54%	51.05%	0.00%	0.94%	0.23%	0.23%	100.00%	
			Female	33.33%	65.22%	0.00%	1.45%	0.00%	0.00%	100.00%	
		D	Male	63.68%	34.33%	0.00%	0.00%	0.00%	1.99%	100.00%	
			Female	47.62%	52.38%	0.00%	0.00%	0.00%	0.00%	100.00%	
Hire and Manage Laborers		P	Male	89.39%	8.36%	0.00%	1.29%	0.32%	0.64%	100.00%	
			Female	75.00%	20.00%	0.00%	5.00%	0.00%	0.00%	100.00%	
	D	Male	86.10%	8.56%	0.00%	1.07%	1.60%	2.67%	100.00%		
		Female	71.43%	4.76%	0.00%	14.29%	0.00%	9.52%	100.00%		

**Table 29- Division of Labor by Household Migration Status**

Category	Activity	Plot	HH Migration	Male MOH	Female MOH	HH Children	Male Laborer	Female Laborer	Other Farm Member	Total	
Preparation	Purchases Inputs	K	Non-Migrant	72.85%	26.94%	0.00%	0.00%	0.00%	0.21%	100.00%	
			Migrant	66.55%	32.98%	0.12%	0.23%	0.00%	0.12%	100.00%	
		P	Non-Migrant	83.62%	15.02%	0.00%	1.02%	0.00%	0.34%	100.00%	
			Migrant	81.91%	16.04%	0.00%	1.02%	0.00%	1.02%	100.00%	
		D	Non-Migrant	93.67%	3.16%	0.00%	0.63%	0.00%	2.53%	100.00%	
			Migrant	81.31%	14.95%	0.00%	1.87%	0.00%	1.87%	100.00%	
	Breaks-up soil/makes rows	K	Non-Migrant	65.53%	21.28%	2.75%	9.83%	0.00%	0.61%	100.00%	
			Migrant	59.47%	28.14%	2.68%	8.79%	0.11%	0.80%	100.00%	
		P	Non-Migrant	52.43%	5.43%	0.94%	38.20%	0.19%	2.81%	100.00%	
			Migrant	46.42%	5.14%	0.18%	44.59%	0.18%	3.49%	100.00%	
		D	Non-Migrant	43.75%	2.73%	0.39%	47.27%	0.39%	5.47%	100.00%	
			Migrant	43.56%	1.23%	0.00%	52.76%	0.00%	2.45%	100.00%	
	Plants seeds/ saplings	K	Non-Migrant	49.03%	49.54%	0.92%	0.31%	0.10%	0.10%	100.00%	
			Migrant	42.26%	57.29%	0.34%	0.11%	0.00%	0.00%	100.00%	
		P	Non-Migrant	75.43%	20.48%	0.68%	2.73%	0.34%	0.34%	100.00%	
			Migrant	79.47%	16.56%	0.33%	2.98%	0.00%	0.66%	100.00%	
		D	Non-Migrant	66.67%	6.17%	0.00%	19.75%	1.85%	5.56%	100.00%	
			Migrant	75.93%	11.11%	0.00%	11.11%	0.00%	1.85%	100.00%	
	Ploughs	K	Non-Migrant	53.20%	14.27%	1.60%	28.67%	0.00%	2.27%	100.00%	
			Migrant	45.89%	19.91%	1.59%	30.01%	0.14%	2.45%	100.00%	
		P	Non-Migrant	30.31%	2.09%	0.00%	65.51%	0.00%	2.09%	100.00%	
			Migrant	30.82%	1.37%	0.00%	64.38%	0.00%	3.42%	100.00%	
		D	Non-Migrant	30.63%	2.50%	0.00%	64.38%	0.00%	2.50%	100.00%	
			Migrant	19.81%	0.00%	0.00%	76.42%	0.00%	3.77%	100.00%	
	Maintains Agro-machinery	All	Non-Migrant	82.09%	4.98%	1.00%	10.95%	0.17%	0.83%	100.00%	
			Migrant	79.52%	8.94%	0.37%	10.61%	0.19%	0.37%	100.00%	
	Tending Crops	Weeds	K	Non-Migrant	13.17%	84.54%	1.24%	0.62%	0.31%	0.10%	100.00%
				Migrant	12.11%	87.31%	0.58%	0.00%	0.00%	0.00%	100.00%
P			Non-Migrant	21.92%	73.85%	0.77%	1.15%	1.54%	0.77%	100.00%	
			Migrant	25.29%	70.82%	1.17%	0.78%	0.78%	1.17%	100.00%	
D			Non-Migrant	23.33%	56.00%	0.67%	2.67%	7.33%	10.00%	100.00%	
			Migrant	25.53%	64.89%	2.13%	1.06%	2.13%	4.26%	100.00%	
Prunes Fruit Trees		K	Non-Migrant	84.66%	12.49%	1.06%	1.80%	0.00%	0.00%	100.00%	
			Migrant	80.62%	16.41%	1.31%	1.55%	0.00%	0.12%	100.00%	
		P	Non-Migrant	83.33%	13.33%	0.00%	1.67%	0.00%	1.67%	100.00%	
			Migrant	83.93%	7.14%	0.00%	0.00%	0.00%	8.93%	100.00%	
		D	Non-Migrant	87.88%	4.55%	0.00%	3.03%	1.52%	3.03%	100.00%	
			Migrant	88.10%	9.52%	0.00%	0.00%	2.38%	0.00%	100.00%	
Applies Irrigation Water		K	Non-Migrant	70.75%	27.42%	1.67%	0.11%	0.00%	0.05%	100.00%	
			Migrant	64.86%	33.21%	1.87%	0.06%	0.00%	0.00%	100.00%	
		P	Non-Migrant	86.59%	9.85%	1.70%	1.87%	0.00%	0.00%	100.00%	
			Migrant	87.31%	8.40%	1.89%	1.72%	0.00%	0.69%	100.00%	
		D	Non-Migrant	89.04%	3.99%	0.33%	2.99%	0.00%	3.65%	100.00%	
			Migrant	89.53%	6.28%	1.05%	2.09%	0.00%	1.05%	100.00%	
Cleans Irrigation Canals		K	Non-Migrant	78.62%	14.94%	2.91%	1.31%	0.00%	2.22%	100.00%	
			Migrant	75.00%	18.43%	2.93%	1.79%	0.00%	1.85%	100.00%	
		P	Non-Migrant	84.17%	7.65%	2.78%	2.26%	0.00%	3.13%	100.00%	
			Migrant	84.28%	7.07%	1.77%	1.94%	0.00%	4.95%	100.00%	
		D	Non-Migrant	88.74%	1.37%	2.73%	4.44%	0.00%	2.73%	100.00%	
			Migrant	84.15%	2.19%	3.28%	6.56%	0.00%	3.83%	100.00%	
Applies Pesticide		K	Non-Migrant	77.94%	21.19%	0.44%	0.44%	0.00%	0.00%	100.00%	
			Migrant	66.35%	31.09%	1.92%	0.64%	0.00%	0.00%	100.00%	
		P	Non-Migrant	87.67%	8.22%	1.37%	1.83%	0.00%	0.91%	100.00%	
			Migrant	86.29%	8.12%	2.54%	1.52%	0.00%	1.52%	100.00%	
		D	Non-Migrant	79.20%	1.60%	0.80%	17.60%	0.00%	0.80%	100.00%	
			Migrant	83.72%	2.33%	0.00%	11.63%	1.16%	1.16%	100.00%	
			K	Non-Migrant	71.94%	27.23%	0.36%	0.48%	0.00%	0.00%	100.00%

	Applies Fertilizer	P	Migrant	62.89%	36.05%	0.92%	0.13%	0.00%	0.00%	100.00%	
			Non-Migrant	87.64%	10.18%	0.00%	2.18%	0.00%	0.00%	100.00%	
			Migrant	86.13%	11.31%	0.36%	0.73%	0.00%	1.46%	100.00%	
		D	Non-Migrant	72.60%	3.42%	0.00%	23.29%	0.00%	0.68%	100.00%	
			Migrant	82.65%	6.12%	0.00%	10.20%	0.00%	1.02%	100.00%	
			Non-Migrant	65.95%	33.81%	0.00%	0.24%	0.00%	0.00%	100.00%	
	Speaks with neighbor in event of irrigation water conflict	All	Migrant	57.75%	41.69%	0.00%	0.00%	0.00%	0.56%	100.00%	
			Non-Migrant	80.90%	18.61%	0.12%	0.12%	0.00%	0.24%	100.00%	
	Speaks with Irrigation service provider	All	Migrant	72.19%	26.97%	0.28%	0.14%	0.00%	0.42%	100.00%	
			Non-Migrant	27.84%	66.29%	5.49%	0.00%	0.12%	0.25%	100.00%	
	Feeds livestock	All	Migrant	27.33%	66.44%	6.22%	0.00%	0.00%	0.00%	100.00%	
			Non-Migrant	29.36%	69.69%	0.63%	0.00%	0.05%	0.26%	100.00%	
	<b>Processing and Marketing</b>	Harvests, Processes & Stores Crops	K	Migrant	23.87%	75.06%	0.66%	0.30%	0.00%	0.12%	100.00%
				Non-Migrant	61.26%	33.38%	1.23%	2.76%	0.61%	0.77%	100.00%
				Migrant	56.78%	38.01%	1.10%	2.84%	0.47%	0.79%	100.00%
D			Non-Migrant	48.83%	24.51%	0.78%	10.51%	7.78%	7.59%	100.00%	
			Migrant	51.28%	33.90%	0.00%	7.41%	4.27%	3.13%	100.00%	
			Non-Migrant	65.60%	33.20%	0.80%	0.40%	0.00%	0.00%	100.00%	
Negotiates Sale of Crops		K	Migrant	56.94%	40.19%	0.48%	1.44%	0.00%	0.96%	100.00%	
			Non-Migrant	84.88%	11.63%	0.00%	2.33%	1.16%	0.00%	100.00%	
			Migrant	75.38%	23.08%	0.00%	1.54%	0.00%	0.00%	100.00%	
		D	Non-Migrant	91.30%	7.83%	0.00%	0.00%	0.00%	0.87%	100.00%	
			Migrant	78.69%	14.75%	0.00%	3.28%	0.00%	3.28%	100.00%	
			Non-Migrant	25.91%	74.09%	0.00%	0.00%	0.00%	0.00%	100.00%	
Stores Seeds		K	Migrant	20.76%	78.64%	0.00%	0.30%	0.00%	0.30%	100.00%	
			Non-Migrant	45.42%	52.99%	1.20%	0.40%	0.00%	0.00%	100.00%	
			Migrant	45.71%	53.06%	0.82%	0.00%	0.00%	0.41%	100.00%	
	D	Non-Migrant	64.39%	34.09%	0.00%	0.00%	0.00%	1.52%	100.00%		
		Migrant	58.89%	38.89%	0.00%	0.00%	0.00%	2.22%	100.00%		
		Non-Migrant	89.53%	7.85%	0.00%	2.09%	0.52%	0.00%	100.00%		
Hire and Manage Laborers	P	Migrant	84.44%	12.78%	0.00%	1.67%	0.00%	1.11%	100.00%		
		Non-Migrant	88.98%	4.72%	0.00%	3.15%	0.79%	2.36%	100.00%		
	D	Migrant	77.78%	13.58%	0.00%	1.23%	2.47%	4.94%	100.00%		
		Non-Migrant	88.98%	4.72%	0.00%	3.15%	0.79%	2.36%	100.00%		

**Table 30-Division of Labor by Jamaot Treatment Status**

Category	Activity	Plot	Jamoat	Male MOH	Female MOH	HH Children	Male Laborer	Female Laborer	Other Farm Member	Total	
Preparation	Purchases Inputs	K	Control	69.05%	30.51%	0.11%	0.11%	0.00%	0.22%	100.00%	
			Treated	70.67%	29.11%	0.00%	0.11%	0.00%	0.11%	100.00%	
		P	Control	82.87%	15.17%	1.12%	0.84%	0.00%	0.00%	100.00%	
			Treated	82.61%	16.09%	0.87%	0.43%	0.00%	0.00%	100.00%	
		D	Control	88.75%	6.88%	0.00%	1.88%	0.00%	2.50%	100.00%	
			Treated	88.57%	9.52%	0.00%	0.00%	0.00%	1.90%	100.00%	
	Breaks-up soil/makes rows	K	Control	67.77%	21.90%	3.25%	6.39%	0.05%	0.64%	100.00%	
			Treated	57.48%	27.19%	2.18%	12.34%	0.05%	0.76%	100.00%	
		P	Control	53.09%	5.07%	0.32%	36.77%	0.00%	4.75%	100.00%	
			Treated	44.20%	5.58%	0.89%	47.99%	0.45%	0.89%	100.00%	
		D	Control	44.30%	2.11%	0.00%	48.10%	0.42%	5.06%	100.00%	
			Treated	42.86%	2.20%	0.55%	51.10%	0.00%	3.30%	100.00%	
	Plants seeds/saplings	K	Control	47.32%	51.61%	0.64%	0.32%	0.00%	0.11%	100.00%	
			Treated	44.32%	54.81%	0.65%	0.11%	0.11%	0.00%	100.00%	
		P	Control	75.77%	19.78%	0.84%	2.51%	0.28%	0.84%	100.00%	
			Treated	80.08%	16.53%	0.00%	3.39%	0.00%	0.00%	100.00%	
		D	Control	74.23%	4.91%	0.00%	14.11%	1.23%	5.52%	100.00%	
			Treated	64.49%	13.08%	0.00%	19.63%	0.93%	1.87%	100.00%	
	Ploughs	K	Control	54.45%	17.32%	2.18%	23.09%	0.00%	2.96%	100.00%	
			Treated	45.89%	16.71%	1.12%	34.29%	0.12%	1.87%	100.00%	
		P	Control	29.57%	2.32%	0.00%	64.35%	0.00%	3.77%	100.00%	
			Treated	32.05%	0.85%	0.00%	65.81%	0.00%	1.28%	100.00%	
		D	Control	28.75%	1.88%	0.00%	66.25%	0.00%	3.13%	100.00%	
			Treated	22.64%	0.94%	0.00%	73.58%	0.00%	2.83%	100.00%	
	Maintains Agro-machinery	All	Control	79.72%	6.24%	0.31%	12.32%	0.31%	1.09%	100.00%	
			Treated	82.36%	7.62%	1.20%	8.82%	0.00%	0.00%	100.00%	
	Tending Crops	Weeds	K	Control	11.10%	87.60%	0.65%	0.33%	0.22%	0.11%	100.00%
				Treated	14.25%	84.10%	1.21%	0.33%	0.11%	0.00%	100.00%
P			Control	20.81%	75.78%	0.93%	0.62%	0.62%	1.24%	100.00%	
			Treated	28.21%	66.67%	1.03%	1.54%	2.05%	0.51%	100.00%	
D			Control	23.68%	59.21%	0.66%	1.32%	4.61%	10.53%	100.00%	
			Treated	25.00%	59.78%	2.17%	3.26%	6.52%	3.26%	100.00%	
Prunes Fruit Trees		K	Control	84.25%	13.02%	1.09%	1.53%	0.00%	0.11%	100.00%	
			Treated	81.19%	15.71%	1.26%	1.83%	0.00%	0.00%	100.00%	
		P	Control	77.03%	14.86%	0.00%	1.35%	0.00%	6.76%	100.00%	
			Treated	95.24%	2.38%	0.00%	0.00%	0.00%	2.38%	100.00%	
		D	Control	87.32%	7.04%	0.00%	2.82%	1.41%	1.41%	100.00%	
			Treated	89.19%	5.41%	0.00%	0.00%	2.70%	2.70%	100.00%	
Applies Irrigation Water		K	Control	68.81%	29.65%	1.48%	0.06%	0.00%	0.00%	100.00%	
			Treated	67.14%	30.64%	2.05%	0.11%	0.00%	0.06%	100.00%	
		P	Control	88.15%	8.37%	0.98%	1.95%	0.00%	0.56%	100.00%	
			Treated	85.05%	10.33%	3.08%	1.54%	0.00%	0.00%	100.00%	
		D	Control	90.97%	2.78%	0.69%	1.74%	0.00%	3.82%	100.00%	
			Treated	86.76%	7.84%	0.49%	3.92%	0.00%	0.98%	100.00%	
Cleans Irrigation Canals		K	Control	77.06%	17.67%	2.52%	1.17%	0.00%	1.60%	100.00%	
			Treated	76.77%	15.54%	3.31%	1.89%	0.00%	2.48%	100.00%	
		P	Control	84.94%	7.60%	1.72%	2.01%	0.00%	3.73%	100.00%	
			Treated	83.11%	6.98%	3.15%	2.25%	0.00%	4.50%	100.00%	
		D	Control	89.36%	0.35%	2.13%	3.90%	0.00%	4.26%	100.00%	
			Treated	83.51%	3.61%	4.12%	7.22%	0.00%	1.55%	100.00%	
Applies Pesticide		K	Control	72.73%	25.91%	0.61%	0.76%	0.00%	0.00%	100.00%	
			Treated	72.13%	25.88%	1.68%	0.31%	0.00%	0.00%	100.00%	
		P	Control	85.71%	9.02%	1.13%	2.26%	0.00%	1.88%	100.00%	
			Treated	89.33%	6.67%	3.33%	0.67%	0.00%	0.00%	100.00%	
		D	Control	79.20%	1.60%	0.80%	17.60%	0.00%	0.80%	100.00%	
			Treated	83.72%	2.33%	0.00%	11.63%	1.16%	1.16%	100.00%	

	Applies Fertilizer	K	Control	67.59%	31.65%	0.38%	0.38%	0.00%	0.00%	100.00%	
			Treated	67.69%	31.20%	0.86%	0.25%	0.00%	0.00%	100.00%	
		P	Control	86.97%	10.91%	0.00%	1.21%	0.00%	0.91%	100.00%	
			Treated	86.76%	10.50%	0.46%	1.83%	0.00%	0.46%	100.00%	
		D	Control	72.60%	3.42%	0.00%	23.29%	0.00%	0.68%	100.00%	
			Treated	82.65%	6.12%	0.00%	10.20%	0.00%	1.02%	100.00%	
	Speaks with neighbor in event of irrigation water conflict	All	Control	64.74%	34.39%	0.00%	0.29%	0.00%	0.58%	100.00%	
			Treated	60.09%	39.91%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Speaks with Irrigation service provider	All	Control	61.20%	16.29%	0.00%	0.20%	0.20%	22.10%	100.00%	
			Treated	61.62%	19.72%	0.32%	0.00%	0.32%	18.02%	100.00%	
	Feeds livestock	All	Control	19.96%	54.89%	3.67%	0.10%	0.20%	21.18%	100.00%	
			Treated	24.41%	51.49%	5.76%	0.00%	0.00%	18.34%	100.00%	
	<b>Processing and Marketing</b>	Harvests, Processes & Stores Crops	K	Control	26.13%	72.65%	0.75%	0.12%	0.06%	0.29%	100.00%
				Treated	27.40%	71.79%	0.54%	0.16%	0.00%	0.11%	100.00%
			P	Control	59.14%	35.25%	1.17%	2.61%	0.65%	1.17%	100.00%
Treated				58.93%	36.28%	1.15%	3.07%	0.38%	0.19%	100.00%	
D			Control	49.81%	28.27%	0.38%	8.65%	5.00%	7.88%	100.00%	
			Treated	49.86%	28.41%	0.58%	10.14%	8.41%	2.61%	100.00%	
Negotiates Sale of Crops		K	Control	62.67%	35.11%	0.44%	1.78%	0.00%	0.00%	100.00%	
			Treated	60.68%	37.61%	0.85%	0.00%	0.00%	0.85%	100.00%	
		P	Control	79.79%	15.96%	0.00%	3.19%	1.06%	0.00%	100.00%	
			Treated	82.46%	17.54%	0.00%	0.00%	0.00%	0.00%	100.00%	
		D	Control	87.83%	10.43%	0.00%	0.00%	0.00%	1.74%	100.00%	
			Treated	85.25%	9.84%	0.00%	3.28%	0.00%	1.64%	100.00%	
Stores Seeds		K	Control	24.90%	74.83%	0.00%	0.14%	0.00%	0.14%	100.00%	
			Treated	22.03%	77.68%	0.00%	0.14%	0.00%	0.14%	100.00%	
		P	Control	44.34%	53.72%	0.00%	1.29%	0.32%	0.32%	100.00%	
			Treated	47.59%	51.87%	0.00%	0.53%	0.00%	0.00%	100.00%	
		D	Control	62.32%	35.51%	0.00%	0.00%	0.00%	2.17%	100.00%	
			Treated	61.90%	36.90%	0.00%	0.00%	0.00%	1.19%	100.00%	
Hire and Manage Laborers		P	Control	88.16%	9.39%	0.00%	1.22%	0.41%	0.82%	100.00%	
			Treated	84.92%	11.90%	0.00%	3.17%	0.00%	0.00%	100.00%	
		D	Control	83.08%	8.46%	0.00%	3.08%	1.54%	3.85%	100.00%	
			Treated	87.18%	7.69%	0.00%	1.28%	1.28%	2.56%	100.00%	

### ANNEX 3 – TABLES FOR DECISION MAKING

**Table 32 - Primary actor for decision making on male and female households (average %)**

Plot	Gender of the HH Head	Male MOH	Female MOH	Children from HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Someone else	Total
Kitchen	Female [n=259]	26.39	73.48	0.08	0.06	0.00	0.00	0.00	100
	Male [n=1638]	62.43	37.48	0.02	0.02	0.00	0.06	0.00	100
Presidential	Female [n=98]	40.59	54.97	0.00	0.16	0.00	4.18	0.10	100
	Male [n=553]	75.99	18.65	0.07	0.60	0.05	4.64	0.00	100
Dehkon	Female [n=28]	60.76	36.76	0.00	0.42	0.00	2.07	0.00	100
	Male [n=248]	86.83	12.31	0.00	0.30	0.00	0.55	0.00	100

Source: Survey data collected by authors in 2016.

**Table 33 - Primary actor for decision making on migrant and non-migrant households (average %)**

Plot	HH Migrant Status	Male MOH	Female MOH	Children from HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Someone else	Total
Kitchen	Non-migrant [n=1005]	61.19	38.70	0.03	0.04	0.00	0.04	0.00	100
	Migrant [n=892]	53.33	46.59	0.02	0.02	0.00	0.05	0.00	100
Presidential	Non-migrant [n=324]	74.59	24.30	0.00	1.00	0.05	0.00	0.05	100
	Migrant [n=327]	73.59	25.68	0.03	0.16	0.00	0.54	0.00	100
Dehkon	Non-migrant [n=166]	86.86	11.90	0.00	0.30	0.00	0.94	0.00	100
	Migrant [n=110]	80.19	19.13	0.00	0.34	0.00	0.34	0.00	100

**Table 34 - Primary actor for decision making in households in treatment and control jamoats (average %)**

Plot	Treatment Status	Male MOH	Female MOH	Children from HH	Male Hired Laborer	Female Hired Laborer	Other Farm Member	Someone else	Total
Kitchen	Control [n=964]	59.70	40.21	0.02	0.03	0.00	0.04	0.00	100
	Treated [n=933]	55.42	44.48	0.03	0.03	0.00	0.04	0.00	100
Presidential	Control [n=391]	74.66	24.10	0.00	0.84	0.00	0.37	0.04	100
	Treated [n=260]	73.14	26.43	0.04	0.24	0.08	0.00	0.00	100
Dehkon	Control [n=166]	82.76	15.93	0.00	0.36	0.00	0.95	0.00	100
	Treated [n=110]	86.64	12.77	0.00	0.24	0.00	0.35	0.00	100

**Table 35 - Overall Division of Labor Across Plots**

Category	Activity	Plot	Male MOH	Female MOH	HH Children	Male Laborer	Female Laborer	Other Farm Member/ Someone else	Total
Land preparation	Crop selection	K	51.45%	48.49%	0.00%	0.05%	0.00%	0.00%	100.00%
		P	69.71%	29.80%	0.00%	0.33%	0.00%	0.16%	100.00%
		D	82.16%	17.10%	0.00%	0.00%	0.00%	0.74%	100.00%
	Amount and variety of inputs to purchase	K	59.00%	40.95%	0.00%	0.06%	0.00%	0.00%	100.00%
		P	72.11%	27.39%	0.00%	0.33%	0.00%	0.17%	100.00%
		D	83.59%	16.03%	0.00%	0.00%	0.00%	0.38%	100.00%
	Whether to purchase inputs on credit	K	68.49%	31.51%	0.00%	0.00%	0.00%	0.00%	100.00%
		P	75.57%	23.78%	0.00%	0.65%	0.00%	0.00%	100.00%
		D	88.69%	10.71%	0.00%	0.00%	0.00%	0.60%	100.00%
	Purchase price and time for small agricultural tools	All	72.93%	27.02%	0.00%	0.00%	0.00%	0.05%	100.00%
Purchase price and time for large agricultural equipment	All	81.81%	17.69%	0.13%	0.00%	0.00%	0.38%	100.00%	
Tending Crops	Amount of irrigation water to apply	K	62.69%	37.20%	0.00%	0.06%	0.00%	0.06%	100.00%
		P	78.66%	20.50%	0.00%	0.67%	0.00%	0.17%	100.00%
		D	90.20%	8.98%	0.00%	0.00%	0.00%	0.82%	100.00%
	When to apply irrigation water	K	58.19%	41.70%	0.06%	0.00%	0.00%	0.06%	100.00%
		P	78.98%	20.17%	0.17%	0.51%	0.00%	0.17%	100.00%
		D	87.50%	12.10%	0.00%	0.00%	0.00%	0.40%	100.00%
Processing and Marketing	Amount of harvest to sell, store and consume	K	44.73%	55.20%	0.07%	0.00%	0.00%	0.00%	100.00%
		P	65.84%	33.54%	0.00%	0.41%	0.00%	0.21%	100.00%
		D	76.86%	22.75%	0.00%	0.00%	0.00%	0.39%	100.00%
	Amount of livestock and poultry products to sell, store and consume	All	65.44%	34.48%	0.00%	0.00%	0.00%	0.08%	100.00%
	How to spend income from crop sales	K	58.26%	41.45%	0.00%	0.00%	0.00%	0.28%	100.00%
		P	67.02%	31.91%	0.00%	0.71%	0.00%	0.35%	100.00%
		D	81.82%	17.70%	0.00%	0.00%	0.00%	0.48%	100.00%
	When to hire wage laborers	P	77.49%	21.20%	0.00%	1.05%	0.00%	0.26%	100.00%
		D	83.33%	12.61%	0.00%	0.00%	3.15%	0.90%	100.00%
	Whom to hire as a wage laborer	P	78.16%	21.05%	0.00%	0.53%	0.00%	0.26%	100.00%
		D	83.89%	14.69%	0.00%	0.00%	0.00%	1.42%	100.00%
	Amount to pay wage laborer	P	77.53%	20.27%	0.00%	0.82%	0.27%	1.09%	100.00%
		D	84.69%	14.35%	0.00%	0.00%	0.00%	0.96%	100.00%

**Table 36 - Division of Decision Making Across Plots by Gender of Household Head**

Category	Activity	Plot	HH Head	Male MOH	Female MOH	HH Children	Male Laborer	Female Laborer	Other Farm Member/ Someone else	Total
Land preparation	Crop selection	K	Male	55.76%	44.18%	0.00%	0.06%	0.00%	0.00%	100.00%
			Female	23.69%	76.31%	0.00%	0.00%	0.00%	0.00%	100.00%
		P	Male	76.15%	23.28%	0.00%	0.38%	0.00%	0.19%	100.00%
			Female	32.22%	67.78%	0.00%	0.00%	0.00%	0.00%	100.00%
		D	Male	84.71%	15.29%	0.00%	0.00%	0.00%	0.00%	100.00%
			Female	59.26%	33.33%	0.00%	0.00%	0.00%	7.41%	100.00%
	Amount and variety of inputs to purchase	K	Male	64.04%	35.96%	0.00%	0.00%	0.00%	0.00%	100.00%
			Female	26.34%	73.25%	0.00%	0.41%	0.00%	0.00%	100.00%
		P	Male	78.03%	21.39%	0.00%	0.39%	0.00%	0.19%	100.00%
			Female	36.78%	63.22%	0.00%	0.00%	0.00%	0.00%	100.00%
		D	Male	87.66%	11.91%	0.00%	0.00%	0.00%	0.43%	100.00%
			Female	48.15%	51.85%	0.00%	0.00%	0.00%	0.00%	100.00%
	Whether to purchase inputs on credit	K	Male	74.59%	25.41%	0.00%	0.00%	0.00%	0.00%	100.00%
			Female	29.91%	70.09%	0.00%	0.00%	0.00%	0.00%	100.00%
		P	Male	80.75%	18.49%	0.00%	0.75%	0.00%	0.00%	100.00%
			Female	42.86%	57.14%	0.00%	0.00%	0.00%	0.00%	100.00%
		D	Male	91.67%	7.69%	0.00%	0.00%	0.00%	0.64%	100.00%
			Female	50.00%	50.00%	0.00%	0.00%	0.00%	0.00%	100.00%
	Purchase price and time for small agricultural tools	All	Male	78.33%	21.61%	0.00%	0.00%	0.00%	0.06%	100.00%
			Female	38.67%	61.33%	0.00%	0.00%	0.00%	0.00%	100.00%
Purchase price and time for large agricultural equipment	All	Male	86.88%	12.68%	0.00%	0.00%	0.00%	0.44%	100.00%	
		Female	50.45%	48.65%	0.90%	0.00%	0.00%	0.00%	100.00%	
Tending Crops	Amount of irrigation water to apply	K	Male	67.72%	32.15%	0.06%	0.06%	0.00%	0.00%	100.00%
			Female	30.89%	69.11%	0.00%	0.00%	0.00%	0.00%	100.00%
		P	Male	84.19%	14.82%	0.00%	0.79%	0.00%	0.20%	100.00%
			Female	47.19%	52.81%	0.00%	0.00%	0.00%	0.00%	100.00%
		D	Male	91.36%	7.73%	0.00%	0.00%	0.00%	0.91%	100.00%
			Female	80.00%	20.00%	0.00%	0.00%	0.00%	0.00%	100.00%
	When to apply irrigation water	K	Male	63.20%	36.67%	0.06%	0.00%	0.00%	0.06%	100.00%
			Female	26.12%	73.88%	0.00%	0.00%	0.00%	0.00%	100.00%
		P	Male	84.23%	14.77%	0.20%	0.60%	0.00%	0.20%	100.00%
			Female	49.44%	50.56%	0.00%	0.00%	0.00%	0.00%	100.00%
D	Male	88.79%	10.76%	0.00%	0.00%	0.00%	0.45%	100.00%		
	Female	76.00%	24.00%	0.00%	0.00%	0.00%	0.00%	100.00%		
Processing and Marketing	Amount harvest to sell, store and consume	K	Male	48.12%	51.88%	0.00%	0.00%	0.00%	0.00%	100.00%
			Female	22.22%	77.25%	0.53%	0.00%	0.00%	0.00%	100.00%
		P	Male	69.67%	29.62%	0.00%	0.47%	0.00%	0.24%	100.00%
			Female	40.63%	59.38%	0.00%	0.00%	0.00%	0.00%	100.00%
		D	Male	79.74%	19.82%	0.00%	0.00%	0.00%	0.44%	100.00%
			Female	53.57%	46.43%	0.00%	0.00%	0.00%	0.00%	100.00%
		All	Male	69.99%	29.92%	0.00%	0.00%	0.00%	0.09%	100.00%

Amount of livestock and poultry products to sell and consume		Female	33.94%	66.06%	0.00%	0.00%	0.00%	0.00%	100.00%
How to spend income from crop sales	K	Male	63.58%	36.09%	0.00%	0.00%	0.00%	0.33%	100.00%
		Female	25.51%	74.49%	0.00%	0.00%	0.00%	0.00%	100.00%
	P	Male	73.22%	25.52%	0.00%	0.84%	0.00%	0.42%	100.00%
		Female	32.56%	67.44%	0.00%	0.00%	0.00%	0.00%	100.00%
	D	Male	84.66%	14.81%	0.00%	0.00%	0.00%	0.53%	100.00%
		Female	55.00%	45.00%	0.00%	0.00%	0.00%	0.00%	100.00%
When to hire wage laborers	P	Male	83.33%	15.41%	0.00%	0.94%	0.00%	0.31%	100.00%
		Female	48.44%	50.00%	0.00%	1.56%	0.00%	0.00%	100.00%
	D	Male	86.36%	10.10%	0.00%	3.03%	0.00%	0.51%	100.00%
		Female	58.33%	33.33%	0.00%	4.17%	0.00%	4.17%	100.00%
Whom to hire as wage laborer	P	Male	84.59%	14.47%	0.00%	0.63%	0.00%	0.31%	100.00%
		Female	45.16%	54.84%	0.00%	0.00%	0.00%	0.00%	100.00%
	D	Male	86.77%	12.17%	0.00%	0.00%	0.00%	1.06%	100.00%
		Female	59.09%	36.36%	0.00%	0.00%	0.00%	4.55%	100.00%
Amount to pay wage laborer	P	Male	81.35%	15.43%	0.96%	0.32%	0.96%	0.96%	100.00%
		Female	52.63%	45.61%	0.00%	0.00%	0.00%	1.75%	100.00%
	D	Male	86.63%	12.83%	0.00%	0.00%	0.00%	0.53%	100.00%
		Female	68.18%	27.27%	0.00%	0.00%	0.00%	4.55%	100.00%

**Table 37 - Division of Decision Making by Household Migrant Status**

Category	Activity	Plot	HH Migration	Male MOH	Female MOH	HH Children	Male Laborer	Female Laborer	Other Farm Member/ Someone else	Total	
<b>Land preparation</b>	Crop selection	K	Non-Migrant	54.75%	45.15%	0.00%	0.10%	0.00%	0.00%	100.00%	
			Migrant	47.78%	52.22%	0.00%	0.00%	0.00%	0.00%	100.00%	
		P	Non-Migrant	69.84%	29.51%	0.00%	0.66%	0.00%	0.00%	100.00%	
			Migrant	69.58%	30.10%	0.00%	0.00%	0.00%	0.32%	100.00%	
		D	Non-Migrant	84.57%	14.81%	0.00%	0.00%	0.00%	0.62%	100.00%	
			Migrant	78.50%	20.56%	0.00%	0.00%	0.00%	0.93%	100.00%	
		Amount and variety of inputs to purchase	K	Non-Migrant	62.49%	37.41%	0.00%	0.10%	0.00%	0.00%	100.00%
				Migrant	55.12%	44.88%	0.00%	0.00%	0.00%	0.00%	100.00%
	P		Non-Migrant	71.76%	27.57%	0.00%	0.66%	0.00%	0.00%	100.00%	
			Migrant	72.46%	27.21%	0.00%	0.00%	0.00%	0.33%	100.00%	
	D		Non-Migrant	84.18%	15.19%	0.00%	0.00%	0.00%	0.63%	100.00%	
			Migrant	82.69%	17.31%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Whether to purchase inputs on credit		K	Non-Migrant	71.37%	28.63%	0.00%	0.00%	0.00%	0.00%	100.00%
				Migrant	65.04%	34.96%	0.00%	0.00%	0.00%	0.00%	100.00%
		P	Non-Migrant	76.07%	22.70%	0.00%	1.23%	0.00%	0.00%	100.00%	
			Migrant	75.00%	25.00%	0.00%	0.00%	0.00%	0.00%	100.00%	
		D	Non-Migrant	91.26%	7.77%	0.00%	0.00%	0.00%	0.97%	100.00%	
			Migrant	84.62%	15.38%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Purchase price and time for small agricultural tools	All	Non-Migrant	76.39%	23.61%	0.00%	0.00%	0.00%	0.00%	100.00%	
			Migrant	69.07%	30.82%	0.00%	0.00%	0.00%	0.11%	100.00%	
	Purchase price and time for large agricultural equipment	All	Non-Migrant	84.23%	15.09%	0.23%	0.00%	0.00%	0.45%	100.00%	
			Migrant	78.75%	20.96%	0.00%	0.00%	0.00%	0.28%	100.00%	
	<b>Tending Crops</b>	Amount of irrigation water to apply	K	Non-Migrant	67.12%	32.67%	0.11%	0.11%	0.00%	0.00%	100.00%
				Migrant	57.75%	42.25%	0.00%	0.00%	0.00%	0.00%	100.00%
P			Non-Migrant	79.19%	20.13%	0.00%	0.67%	0.00%	0.00%	100.00%	
			Migrant	78.11%	20.88%	0.00%	0.67%	0.00%	0.34%	100.00%	
D			Non-Migrant	90.60%	8.05%	0.00%	0.00%	0.00%	1.34%	100.00%	
			Migrant	89.58%	10.42%	0.00%	0.00%	0.00%	0.00%	100.00%	
When to apply irrigation water			K	Non-Migrant	61.74%	38.16%	0.10%	0.00%	0.00%	0.00%	100.00%
				Migrant	54.25%	45.63%	0.00%	0.12%	0.00%	0.00%	100.00%
		P	Non-Migrant	80.47%	18.86%	0.00%	0.67%	0.00%	0.00%	100.00%	
			Migrant	77.47%	21.50%	0.34%	0.34%	0.00%	0.34%	100.00%	
D		Non-Migrant	88.08%	11.26%	0.00%	0.00%	0.00%	0.66%	100.00%		
		Migrant	86.60%	13.40%	0.00%	0.00%	0.00%	0.00%	100.00%		
<b>Processing and Marketing</b>	Amount of agricultural produce to	K	Non-Migrant	47.92%	52.08%	0.00%	0.00%	0.00%	0.00%	100.00%	
			Migrant	41.10%	58.75%	0.15%	0.00%	0.00%	0.00%	100.00%	

sell, store and consume	P	Non-Migrant	66.93%	32.28%	0.00%	0.79%	0.00%	0.00%	100.00%
		Migrant	64.66%	34.91%	0.00%	0.00%	0.00%	0.43%	100.00%
	D	Non-Migrant	79.22%	20.13%	0.00%	0.00%	0.00%	0.65%	100.00%
		Migrant	73.27%	26.73%	0.00%	0.00%	0.00%	0.00%	100.00%
Amount of livestock and poultry products to sell and consume	All	Non-Migrant	67.67%	32.33%	0.00%	0.00%	0.00%	0.00%	100.00%
		Migrant	62.91%	36.93%	0.00%	0.00%	0.00%	0.16%	100.00%
How to spend income from crop sales	K	Non-Migrant	62.94%	36.80%	0.00%	0.00%	0.00%	0.25%	100.00%
		Migrant	52.27%	47.40%	0.00%	0.00%	0.00%	0.32%	100.00%
	P	Non-Migrant	66.23%	32.45%	0.00%	1.32%	0.00%	0.00%	100.00%
		Migrant	67.94%	31.30%	0.00%	0.00%	0.00%	0.76%	100.00%
	D	Non-Migrant	84.33%	14.93%	0.00%	0.00%	0.00%	0.75%	100.00%
		Migrant	77.33%	22.67%	0.00%	0.00%	0.00%	0.00%	100.00%
When to hire wage laborers	P	Non-Migrant	78.11%	19.90%	0.00%	1.99%	0.00%	0.00%	100.00%
		Migrant	76.80%	22.65%	0.00%	0.00%	0.00%	0.55%	100.00%
	D	Non-Migrant	88.81%	6.72%	0.00%	2.99%	0.00%	1.49%	100.00%
		Migrant	75.00%	21.59%	0.00%	3.41%	0.00%	0.00%	100.00%
Whom to hire as wage laborer	P	Non-Migrant	79.31%	19.70%	0.00%	0.99%	0.00%	0.00%	100.00%
		Migrant	76.84%	22.60%	0.00%	0.00%	0.00%	0.56%	100.00%
	D	Non-Migrant	88.46%	10.00%	0.00%	0.00%	0.00%	1.54%	100.00%
		Migrant	76.54%	22.22%	0.00%	0.00%	0.00%	1.23%	100.00%
Amount to pay wage laborer	P	Non-Migrant	78.01%	19.90%	0.00%	1.05%	0.52%	0.52%	100.00%
		Migrant	77.01%	20.69%	0.00%	0.57%	0.00%	1.72%	100.00%
	D	Non-Migrant	89.06%	10.16%	0.00%	0.00%	0.00%	0.78%	100.00%
		Migrant	77.78%	20.99%	0.00%	0.00%	0.00%	1.23%	100.00%

**Table 38 - Division of Decision Making by Jamaot Treatment Status**

Category	Activity	Plot	Jamoat	Male MOH	Female MOH	HH Children	Male Laborer	Female Laborer	Other Farm Member/ Someone else	Total	
Land preparation	Crop selection	K	Control	54.18%	45.72%	0.00%	0.11%	0.00%	0.00%	100.00%	
			Treated	48.70%	51.30%	0.00%	0.00%	0.00%	0.00%	100.00%	
		P	Control	68.92%	30.27%	0.00%	0.54%	0.00%	0.27%	100.00%	
			Treated	70.90%	29.10%	0.00%	0.00%	0.00%	0.00%	100.00%	
		D	Control	79.88%	19.51%	0.00%	0.00%	0.00%	0.61%	100.00%	
			Treated	85.71%	13.33%	0.00%	0.00%	0.00%	0.95%	100.00%	
	Amount and variety of inputs to purchase	K	Control	59.54%	40.46%	0.00%	0.00%	0.00%	0.00%	100.00%	
			Treated	58.45%	41.44%	0.00%	0.11%	0.00%	0.00%	100.00%	
		P	Control	71.55%	27.62%	0.00%	0.55%	0.00%	0.28%	100.00%	
			Treated	72.95%	27.05%	0.00%	0.00%	0.00%	0.00%	100.00%	
		D	Control	82.05%	17.31%	0.00%	0.00%	0.00%	0.64%	100.00%	
			Treated	85.85%	14.15%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Whether to purchase inputs on credit	K	Control	71.18%	28.82%	0.00%	0.00%	0.00%	0.00%	100.00%	
			Treated	66.16%	33.84%	0.00%	0.00%	0.00%	0.00%	100.00%	
		P	Control	75.14%	23.70%	0.00%	1.16%	0.00%	0.00%	100.00%	
			Treated	76.12%	23.88%	0.00%	0.00%	0.00%	0.00%	100.00%	
		D	Control	87.88%	11.11%	0.00%	0.00%	0.00%	1.01%	100.00%	
			Treated	89.86%	10.14%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Purchase price and time for small agricultural tools	All	Control	75.16%	24.74%	0.00%	0.00%	0.00%	0.10%	100.00%	
			Treated	70.59%	29.41%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Purchase price and time for large agricultural equipment	All	Control	80.05%	19.41%	0.00%	0.00%	0.00%	0.53%	100.00%	
			Treated	83.37%	16.15%	0.24%	0.00%	0.00%	0.24%	100.00%	
	Tending Crops	Amount of irrigation water to apply	K	Control	64.76%	35.24%	0.00%	0.00%	0.00%	0.00%	100.00%
				Treated	60.58%	39.19%	0.11%	0.11%	0.00%	0.00%	100.00%
P			Control	78.67%	20.22%	0.00%	0.83%	0.00%	0.28%	100.00%	
			Treated	78.63%	20.94%	0.00%	0.43%	0.00%	0.00%	100.00%	
D			Control	88.11%	10.49%	0.00%	0.00%	0.00%	1.40%	100.00%	
			Treated	93.14%	6.86%	0.00%	0.00%	0.00%	0.00%	100.00%	
When to apply irrigation water		K	Control	59.36%	40.53%	0.00%	0.11%	0.00%	0.00%	100.00%	
			Treated	57.00%	42.89%	0.11%	0.00%	0.00%	0.00%	100.00%	
		P	Control	79.33%	19.83%	0.00%	0.56%	0.00%	0.28%	100.00%	
			Treated	78.45%	20.69%	0.43%	0.43%	0.00%	0.00%	100.00%	
		D	Control	86.30%	13.01%	0.00%	0.00%	0.00%	0.68%	100.00%	
			Treated	89.22%	10.78%	0.00%	0.00%	0.00%	0.00%	100.00%	
Processing and Marketing	Amount of agricultural produce to sell, store and consume	K	Control	46.30%	53.57%	0.13%	0.00%	0.00%	0.00%	100.00%	
			Treated	43.06%	56.94%	0.00%	0.00%	0.00%	0.00%	100.00%	
		P	Control	66.45%	32.56%	0.00%	0.66%	0.00%	0.33%	100.00%	
			Treated	64.86%	35.14%	0.00%	0.00%	0.00%	0.00%	100.00%	

	D	Control	76.40%	22.98%	0.00%	0.00%	0.00%	0.62%	100.00%	
		Treated	77.66%	22.34%	0.00%	0.00%	0.00%	0.00%	100.00%	
	Amount of livestock and poultry products to sell and consume	All	Control	65.34%	34.50%	0.00%	0.00%	0.00%	0.15%	100.00%
			Treated	65.54%	34.46%	0.00%	0.00%	0.00%	0.00%	100.00%
	How to spend income from crop sales	K	Control	62.57%	37.14%	0.00%	0.00%	0.00%	0.29%	100.00%
			Treated	53.98%	45.74%	0.00%	0.00%	0.00%	0.28%	100.00%
		P	Control	69.46%	28.74%	0.00%	1.20%	0.00%	0.60%	100.00%
			Treated	63.48%	36.52%	0.00%	0.00%	0.00%	0.00%	100.00%
		D	Control	80.00%	19.23%	0.00%	0.00%	0.00%	0.77%	100.00%
			Treated	84.81%	15.19%	0.00%	0.00%	0.00%	0.00%	100.00%
	When to hire wage laborers	P	Control	78.71%	19.68%	0.00%	1.20%	0.00%	0.40%	100.00%
			Treated	75.19%	24.06%	0.00%	0.75%	0.00%	0.00%	100.00%
		D	Control	80.71%	14.29%	0.00%	3.57%	0.00%	1.43%	100.00%
			Treated	87.80%	9.76%	0.00%	2.44%	0.00%	0.00%	100.00%
	Whom to hire as wage laborer	P	Control	79.52%	19.28%	0.00%	0.80%	0.00%	0.40%	100.00%
			Treated	75.57%	24.43%	0.00%	0.00%	0.00%	0.00%	100.00%
		D	Control	82.44%	16.03%	0.00%	0.00%	0.00%	1.53%	100.00%
			Treated	86.25%	12.50%	0.00%	0.00%	0.00%	1.25%	100.00%
	Amount to pay wage laborer	P	Control	78.81%	19.07%	0.00%	0.85%	0.00%	1.27%	100.00%
			Treated	75.19%	22.48%	0.00%	0.78%	0.78%	0.78%	100.00%
D		Control	83.85%	15.38%	0.00%	0.00%	0.00%	0.77%	100.00%	
		Treated	86.08%	12.66%	0.00%	0.00%	0.00%	1.27%	100.00%	